

WIRE

July 1995

Esther Dyson's radical rethink of intellectual property.
Finally hands-on: the first interactive TV tests.
Douglas Coupland's Microserfs return.

Bad-boy evolutionist

Richard Dawkins:

Selfish genes and hot memes
are the new mass media.

Dünyasal bağ kurun!



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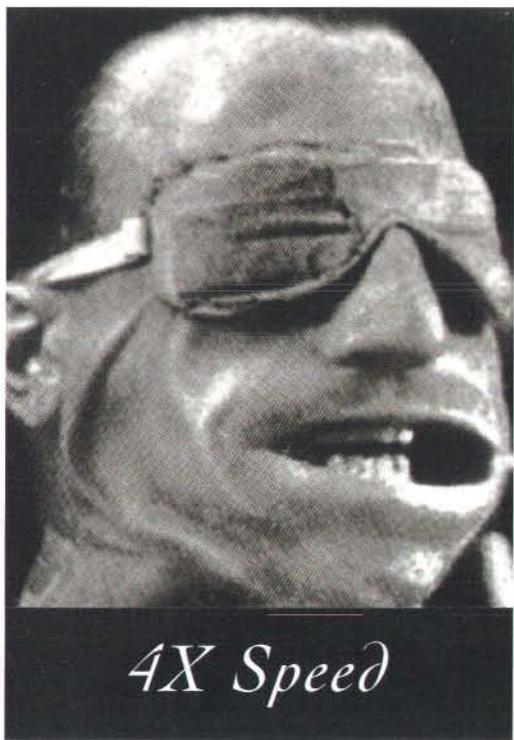


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*M*ike Sullivan uses fluorescent lighting in his house—to conserve electricity. He uses a drip irrigation system in his yard—to conserve water. And he bought his Saturn wagon, well, to conserve money.

This is not to say Mike is a contemporary tightwad by any means. He's a seventh grade math teacher—who, understandably, views life a little like a latter-day Pythagoras.

So we weren't surprised when we asked Mike about his Saturn and his face lit up as he described how little a Saturn costs him to own by his own linear calculations.

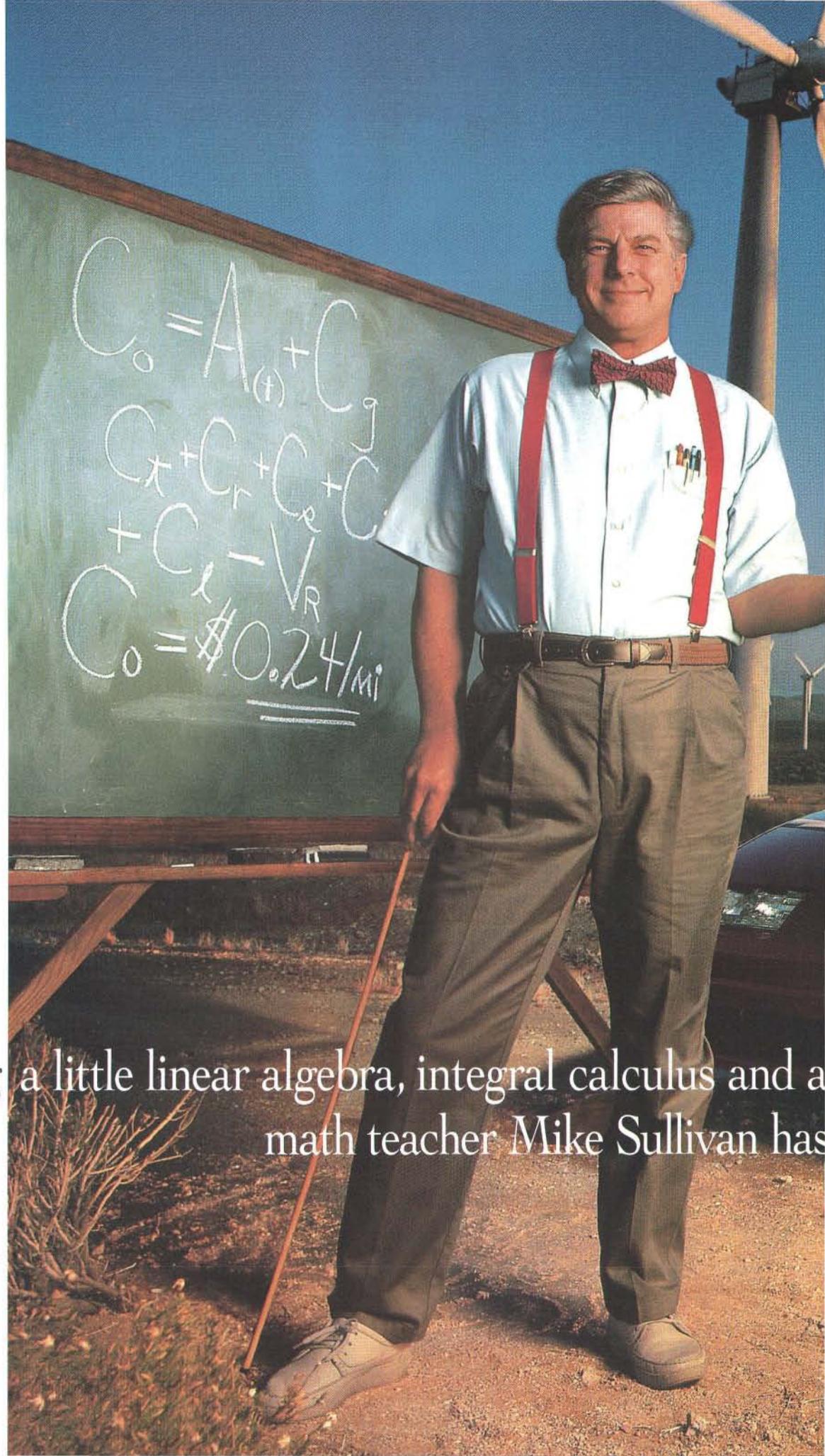
Basically, Mike added his buying cost to the cost of tires, repairs, maintenance, insurance and license for five years, subtracted the resale value, then divided by 60,000 miles and came out with what it would typically cost him to own a Saturn. Or, about twenty-four cents a mile.

Of course, it's not just the Saturn Mike calculates down to the penny. He figures his Saturn costs

*B*y using

him a lot less to operate than the pickup truck he owns...and, well, just a bit more than his lawnmower.

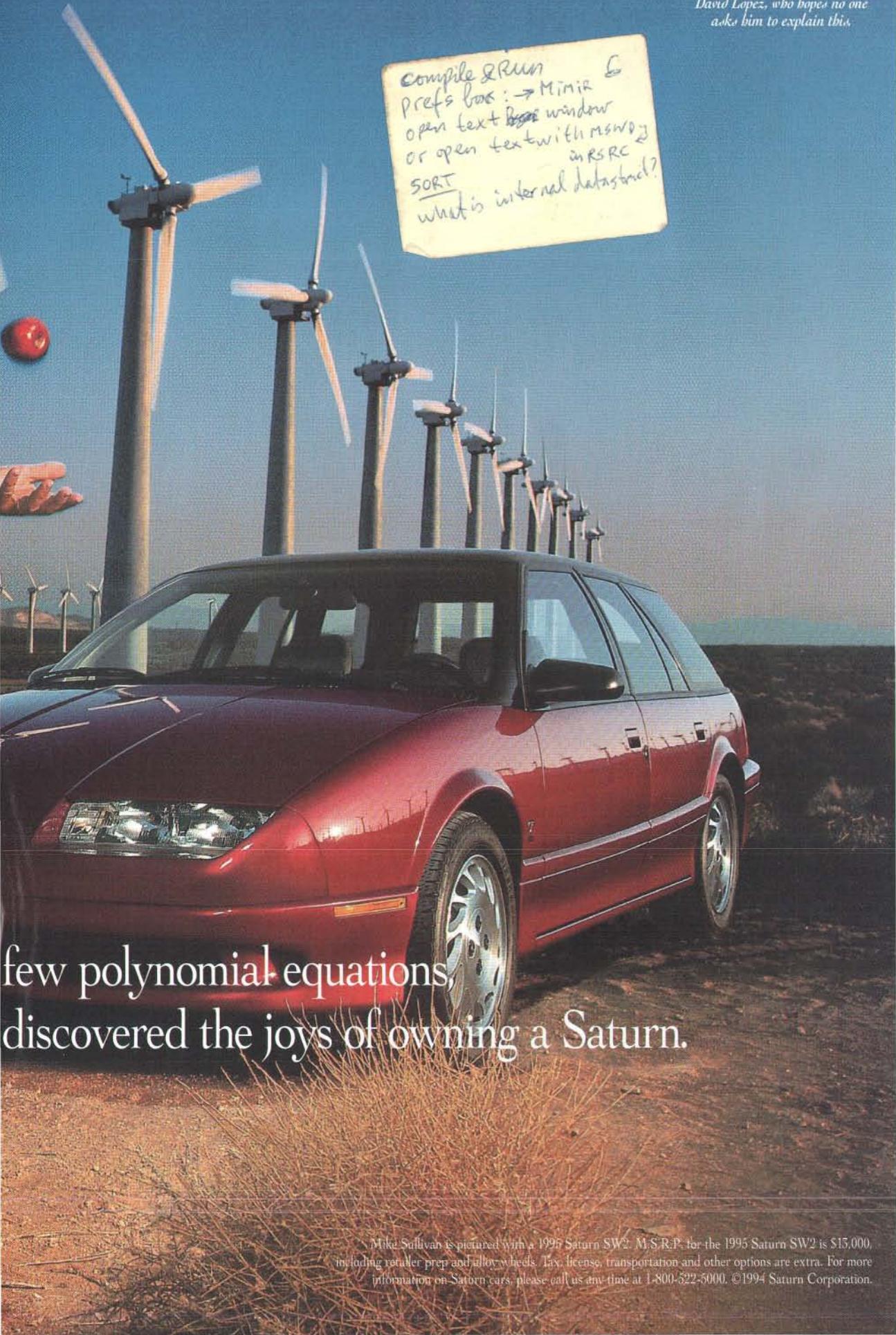
Now granted, the Saturn's not much of a mulcher, but Mike says it's a whole lot more fun.



a little linear algebra, integral calculus and a math teacher Mike Sullivan has

*Mike bought his Saturn at
Saturn of Bakersfield from
David Lopez, who hopes no one
asks him to explain this.*

compile & run
prefs box : → Miniz
open text ~~box~~ window
or open text with mswiz
SORT in RSCRC
what is internal database?



**few polynomial equations,
discovered the joys of owning a Saturn.**

Mike Sullivan is pictured with a 1995 Saturn SW2. M.S.R.P. for the 1995 Saturn SW2 is \$15,000, including retailer prep and alloy wheels. Tax, license, transportation and other options are extra. For more information on Saturn cars, please call us any time at 1-800-522-5000. ©1994 Saturn Corporation.

*You don't really have to be
Sir Isaac Newton—or even a
Mike Sullivan—to discover
one of the little-known joys of
owning a Saturn. Something
called *The 1994 Complete Car
Cost Guide* by IntelliChoice®,
Inc. does a lot of the noodle*



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to car.) When they add it all up,
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of the lowest ownership costs in
their class. But, if you feel like
you missed all the "fun," you can
always integrate the functions
over time and hunker down with
a few polynomial equations.*



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Mike Backes
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(Yes, this really is Mr. Backes)

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-8-wireless

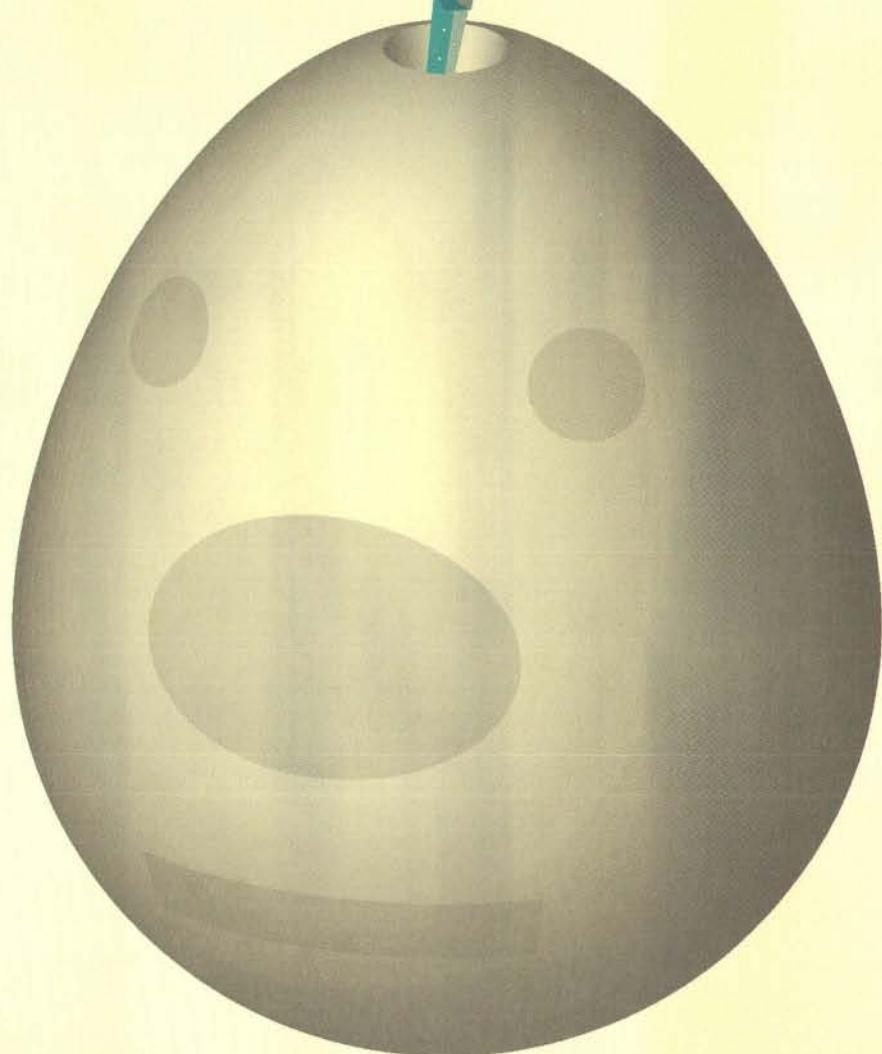
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Not only

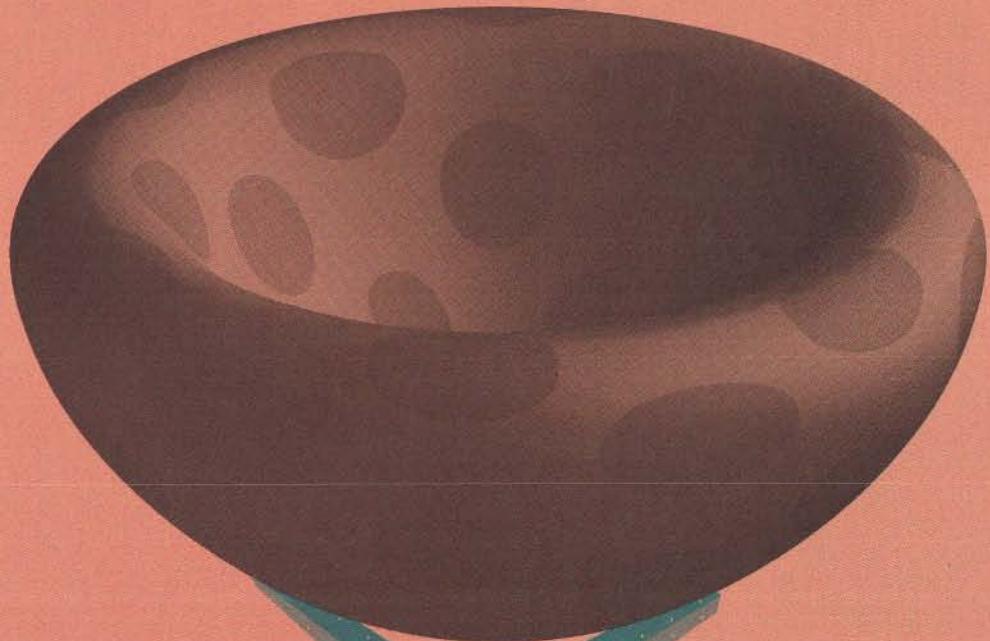
does the body of an organism

march to the orders of

its genes,

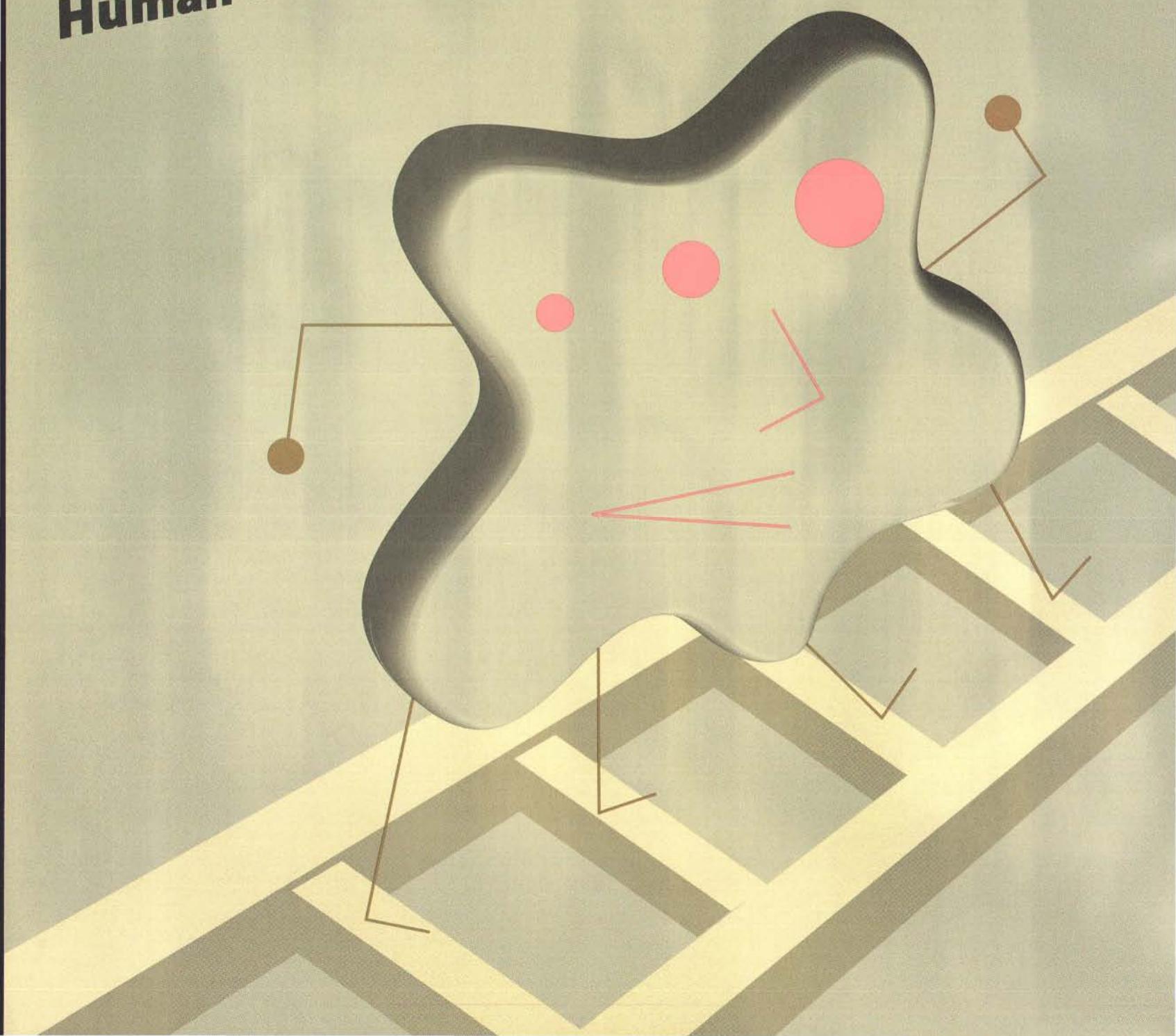


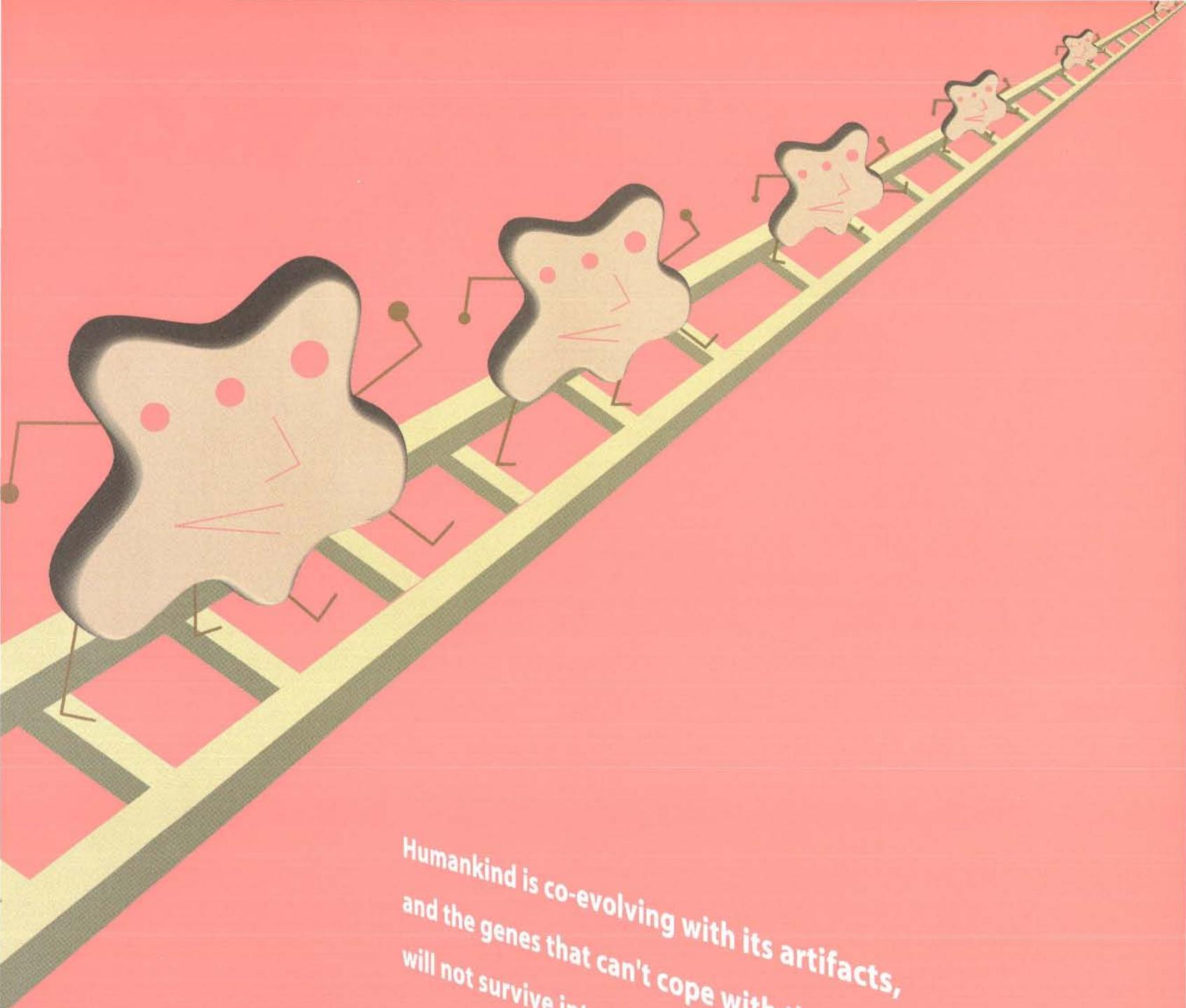
but so do the artifacts the organism builds or uses.



(In this sense,
the egg uses both a
chicken and a nest to
make another egg,
and so the nest, too,
is an evolutionary
extension of the egg.)

Human evolution is now inextricably bound up with technological evolution.





Humankind is co-evolving with its artifacts,
and the genes that can't cope with that new reality
will not survive into future millennia.

- Michael Schrage, page 120

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3.07

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What's in a Name?

I have two very strong objections to your article on viruses ("Viruses Are Good for You," *Wired* 3.02, page 126). First, you confuse the issue by applying the word virus to things that are not viruses. Second, you glorify virus writers by endowing them with a vision they do not have.

Organic viruses infect us and make us sick. Computer viruses get on our machines against our will and often damage data. Referring to the network agents of General Magic or the digital organisms of Tierra as viruses does serious harm to work on those new technologies. The public is not sufficiently familiar with the issues to understand that the word virus is being misapplied.

On the second point, your article suggests that underground virus writers have pointed the way toward the computational future of the Net. You are giving them credit way beyond what they deserve. In my view, they are not visionaries but delinquents.

Tom Ray
ATR Human Information Processing Research Laboratories
ray@santafe.edu

The point of the article is that viruses can be both useful and destructive. Yes, the public usually associates the negative with viruses. But it doesn't have to, and this is why this article was run: to educate the public.

Tom, I think you'll get a lot further in your efforts to colonize the Net (a goal I am in favor of) if, instead of denying your work is unrelated to viruses, you were to cop to the fact and take the discussion beyond that level. – Kevin Kelly

Lawyers Online

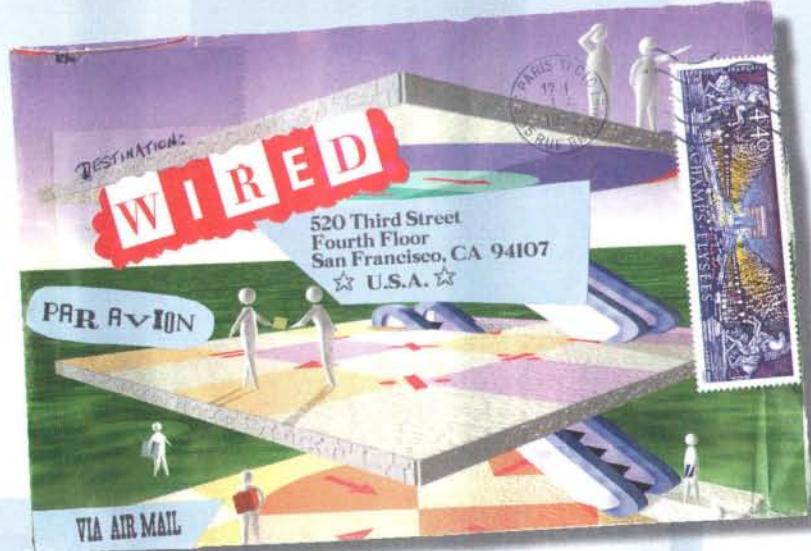
I am a Lexis Counsel Connect user and have found it invaluable ("The Supreme Court," *Wired* 3.03, page 116). Although your description of its technical problems is accurate, the service may be more revolutionary than you described. By providing access to spe-

cialized expertise without having to consult a large law firm, Counsel Connect has the potential to profoundly decentralize the country's legal profession.

Jeremy D. Weinstein, Esq.
ehkn28a@prodigy.com

Share the Wealth

You headlined the review of Klik & Play "Shareware Game Maker" (*Wired* 3.04, page 155). What you failed to mention (and what you've got to call Europress in England to find out) is that in order to distribute the games you create as shareware, you must first pay



Europress US\$165 for a license. And if that's not enough, you must then submit your game to the Recreational Software Advisory Council to "ensure that your games or programs include no obscene or offensive material." That's another \$25.

Klik & Play is a lot of fun, but I sure wouldn't have bought the program if the price on the box was \$230 instead of \$40!

Mike Yacullo
myacullo@echonyc.com

Young or Old Elvis?

Jon Katz spins a quaint little tale about Elvis's adolescence and young adulthood ("Why Elvis Matters," *Wired* 3.04, page 100). Too bad the portrait he paints

of a "poor, spiritual, simple, young, family-centered" Elvis and the American cultural landscape that produced him is as simplistic and mythologized as the tabloid view of the King.

The "black-and-white world" Elvis and his young fans supposedly inhabited had, of course, already discovered television, the first of Katz's revolutionary "means of expression." The movies, which Katz dismisses out of hand, were a potent source of communal values as well – values often staked along generational lines, as any fan of James Dean will tell you. Add to these media the subterranean social rumblings caused by the Beats, increasing racial tension, and the queasy spectacle of the McCarthy hearings, and America in the early '50s becomes a very expansive, complicated place for a teenager indeed.

But Katz's simplistic portrait better serves his rhetorical purpose: to convince the "kids" of the Net that they're on the front lines of a new, idealistic, autonomous revolution, delivering a "devastating" blow to some vague, nefarious "Them."

The Net actually bears a closer resemblance to Elvis's later career and afterlife than to anything else: a titillating, often exhilarating, sometimes nauseating playground of images, bombast, and unexpected inspiration, in which commerce, expression, and identity are uneasily yoked.

Ed Heinemann
word@leland.stanford.edu

Intellectual Cocooning

David Weinberger's "The Daily Me? No, the Daily Us" (*Wired* 3.04, page 108) totally misses the point. Of course traditional newspapers play an important role as social glue. And of course editors' judgments and points of view create a sense of community and awareness of what is relevant. But there's no need to choose between mass-media publications and the social tunnel vision Weinberger fears will result from personalized software agents.

	THE TOP 501 REASONS	
	REASON No.	102

THE BUTTON FLY INCREASES FINGER DEXTERITY.

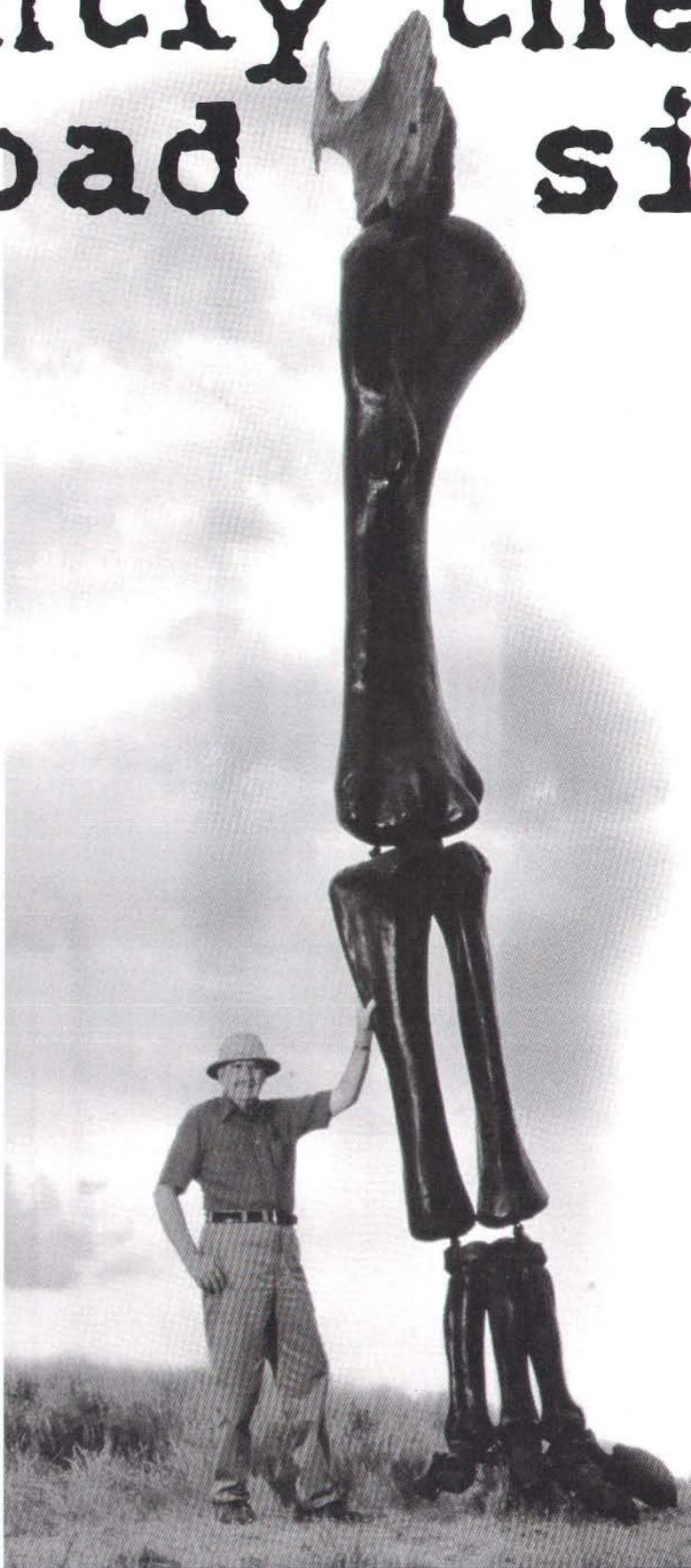


Apparently the not a bad si

9. Thoughts on international business.

For many years growth was one of the business community's main driving forces. The occasional question marks were trivialized with terms such as "economy of scale" and "critical mass". Once you were big enough, you were considered unassailable.

We have since found out that it was precisely the size of seemingly invulnerable mammoth organizations which turned out to be a handicap in many cases. These giants found themselves beset by so many new, smaller, flexible and highly motivated companies nipping at their ankles that they started to totter. Which explains the efforts currently under way within many an organization to find ways of restoring a degree of flexibility to what is now realized to be an unwieldy structure. That is why Origin considers itself fortunate never



human scale is size to survive.

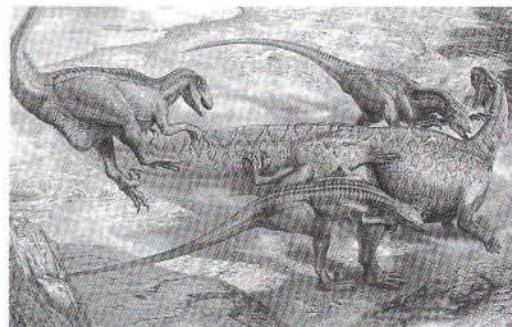
to have lost track of the human condition. Right from the beginning, some twenty years ago, we opted for a chain of independent outlets responsible for their own affairs, and having their own targets to achieve.

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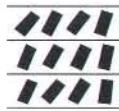
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Human energy into information technology.

Two common phenomena refute the idea that we will retreat into predetermined intellectual cocoons:

First, when do newspapers sell the most copies? The day after everyone knows all the facts from radio, TV, online services, and word of mouth. People want the perspective that newspapers provide.

Second, when agents are combined with hypertext links, people tend to read more, not less, broadly. Surfing the Net has become the analog of skimming the paper. The results are equally serendipitous.

There's nothing inconsistent with mass media and powerful personal news agents. Sure, dots of ink on paper will eventually be replaced by dots of phosphorus on a screen. But that isn't regrettable, because the same news-gathering – and news-analyzing – organizations that publish on paper today will fill that screen tomorrow.

Geoffrey E. Moore
jeff@prodigy.com

Double Agent

The increased freedom the Net supposedly provides has always been a red herring ("Agent of Change," *Wired* 3.04, page 116). As Pattie Maes says, "We think it's important to keep the users in control, or at least always give them the impression they are in control."

Cyberspace is not a free space (it's not an ocean that one "surfs"), it is a *guided* space, a governed space. All agents are double agents – they work for you, but also for Microsoft.

J. Macgregor Wise
Urbana, Illinois

Behind the Times

I read *Wired* to keep up with art, music, business, communication, etc., in relation to the Internet and technology.

But, because *Wired* is so jam-packed with content, I cannot keep up with the issues as they come out. Hence, I am 10 issues behind.

I hope you take a summer vacation or something.

Neil Barman
nbarman@nero.uvic.ca

The Game is the Technology

I just finished reading the conversation between Ron Martinez and Michael Backes ("Shape Shifter," *Wired* 3.04, page 88) and have come to the conclusion that these guys have no clue.

It's obvious to any serious game player, if not any marketing VP, that technology still drives games. Look at the biggest and most groundbreaking work; it hasn't come from the artist-given-digital-tools that everyone's hyping, but from the tech guy who gets up one day and starts to make a game. *Doom*, *Myst*, *Street Fighter II*, *Zelda*, even *Pac-Man* and *Pong* all came from people who had the tech understanding first, then started coming up with the ideas.

I would have thought you smart enough to see through Backes. He claims the thing to do is get the story and then adapt it to the particular platform or technology. Remember: the medium is the message.

Chris Jones
coldjones@mail.utexas.edu

Viacom Swallows

While John Batelle gives a good account of Viacom's development into a new media giant ("Viacom Doesn't Suck!," *Wired* 3.04, page 110), he fails to mention its shortcomings. Just like Sony, Viacom owns killer content in the conventional media section. So far, neither Sony nor Viacom has succeeded in translating this into good games. *Beavis and Butt-head*, as well as *Club Dead*, were fair at best, and far from innovative. To produce great games, Viacom had to swallow smaller game companies like Virgin.

However great the Viacom in-house game productions may sell, they have little to offer in terms of interactivity and gaming value. The interactive stuff our dreams are made of won't be made by megacorporations, but by companies that have been in this business for years and years.

Elmar Schwarzl
evs@mars.gp.schwaben.de

Becoming One with Technology

In "Faded Genes," Greg Blonder comments, "Humans are programming computers today that will someday take our place in nature...." (*Wired* 3.03, page 107). This may not be an accurate assessment. There exists the possibility that humans will become so necessary to the functioning of computers that we are no longer viewed as separate entities. There is precedent for this in biology: the mitochondria. Mitochondria are the organelle in the cell that manage energy consumption. It is believed that at one time, they were free-floating viruses that found it beneficial to join with a host. Mitochondria are now so integrated into intracellular life that without them we would die. We and they have co-evolved into something neither could be without the other. I suspect the same will be true of humans and computers.

Allison Leonard
Dallas, Texas

Straight from the Source

I was surprised to read the *Wired* 3.04 letter titled "The People Are Powerless" (page 28), which suggests that the White House edits its postings. This is untrue.

The White House has no control over any of the White House forums on any of the commercial services. Each service gets a complete document feed from the White House. It is asked not to edit the posts and to post them to read-only directories.

What those services do with the document feed,

how they charge for it, what they post, when they post, and when they remove it is up to the owner or operator of the service. They may make no claims of special relationship with the White House.

To go to the source for documents, e-mail the Almanac server at publications@whitehouse.gov or try the publications section on the White House home page at <http://www.whitehouse.gov/>.

Jonathan Gill
jgill@casti.com

Global Consciousness

The PEAR team ("Mind over Matter," *Wired* 3.04, page 80) waxes ecstatic over human minds diddling a "random number generator," "altering one bit in 1,000," and doing it "as far away as Hungary, Kenya, Brazil, and India." What is the control experiment when the 5.6 billion minds within 7,930 miles of Princeton can all be unwitting participants?

Alan M. Schwartz
Irvine, California

The People's Paine

Just read the article "The Age of Paine" (*Wired* 3.05, page 154), and wanted to note that *The Age of Reason and Common Sense* are on the Web at <http://www.hypermall.com/LibertyOnline/>.

There are a number of other historical documents there, and we're scouring the world for more. None of these documents was given to us to read in school – they were all "interpreted" for us instead. It's time Americans took politics and history back from the ivory-tower academics and professional politicians. And the Internet will let us.

Jawaid Bazyar
bazyar@hypermall.com

Undo!

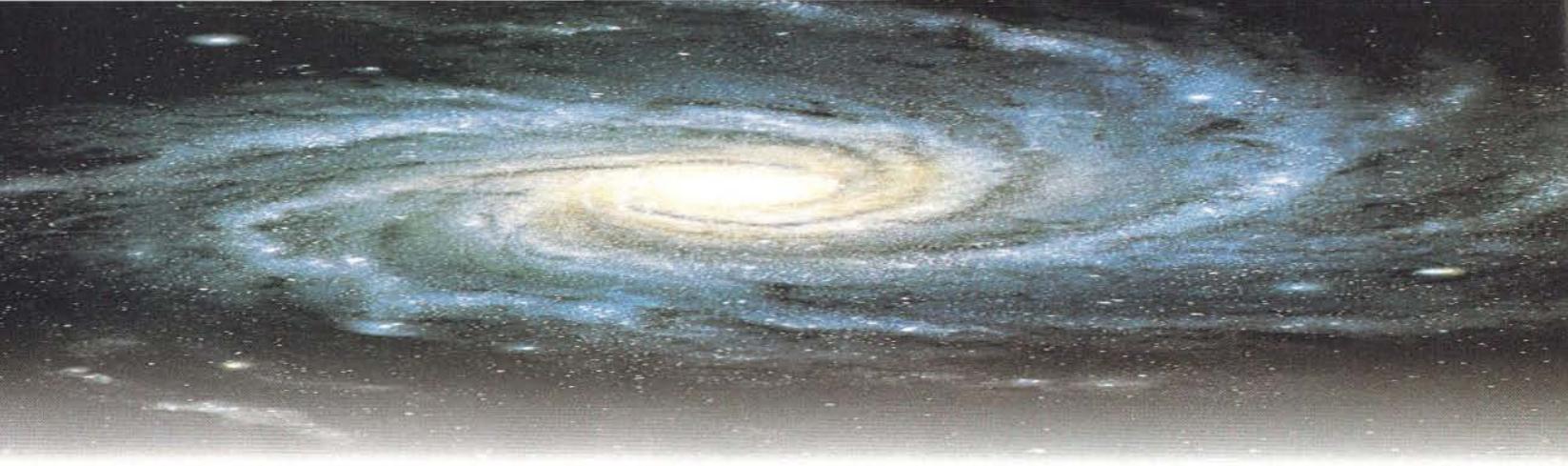
- The correct address for information about the Loebner Prize for Artificial Intelligence ("What's It Mean to Be Human Anyway?" *Wired* 3.04, page 132) is Hugh Loebner, Crown Industries Incorporated, 155 North Park Street, East Orange, NJ 07017, or loebner@acm.org. • We forgot to mention that it costs money to subscribe to the *Leonardo Electronic Almanac* ("Mona Lisa Hard Drive," *Wired* 3.04, page 47). A one-year subscription is US\$15 for Leonardo members and \$25 for everyone else. • Contrary to our claims, the Internet Phone program is not currently available for the Macintosh ("The Internet as Ma Bell," *Wired* 3.05, page 46). However, a similar program that does work on the Mac is available at <http://www.emagic.com>.

Send your Rants & Raves to:

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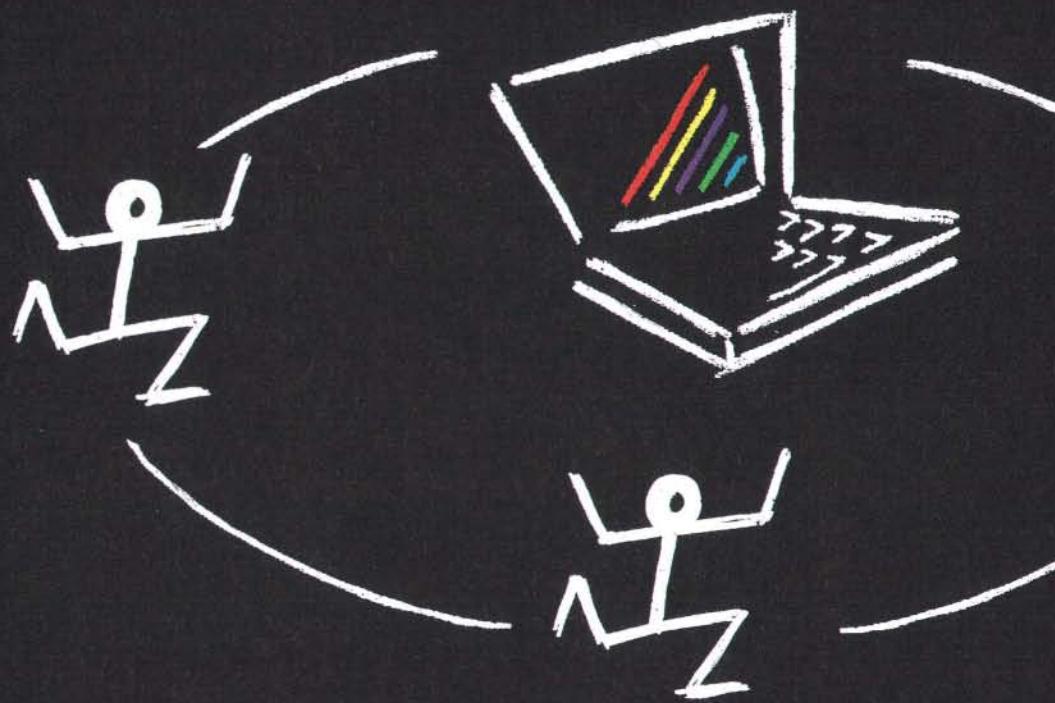
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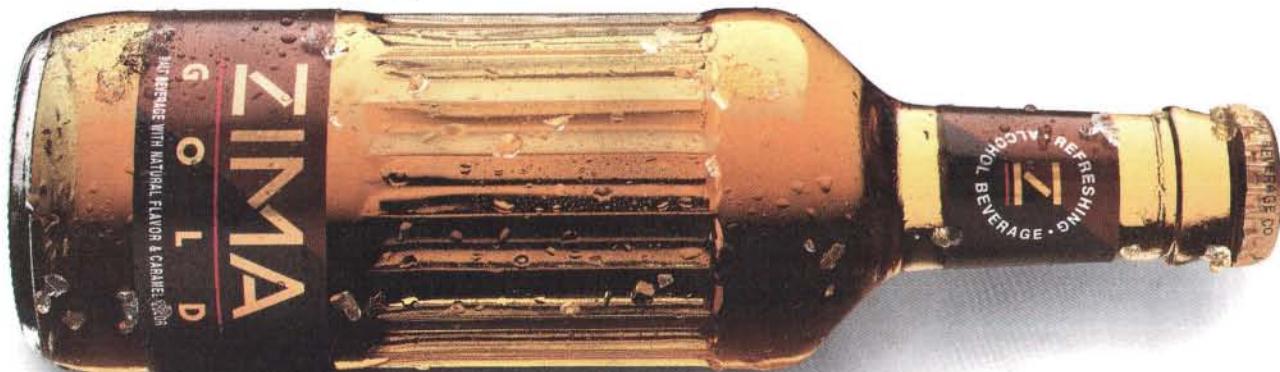
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New Scapegoat: The Internet

In the wake of Oklahoma City, anti-violence/pornography/bomb downloading rhetoric is becoming the stock-in-trade of pandering politicians who wouldn't know a modem if it hit them in the head.

Evidence: on the right, we have self-proclaimed "moderate" Senator Arlen Specter (R-Pennsylvania) calling a hearing of which the subtext was how the Internet, somehow, represents a clear and present danger to the American way of life, threatening innocent citizens and children.

On the left, we have supposedly liberal Senator Dianne Feinstein (D-California) rebuking a panel of experts who pointed out that the First Amendment was designed to protect uncomfortable speech, even "bomb-making information" located online. (She failed to mention that this same information is available in most libraries or that it is actually being published by the USDA Forest Service in a guide.)

The ignorant posturings of these and other politicians and Congresscritters would be ludicrous if they weren't so dangerous. Waiting in the wings, ready to eviscerate civil rights in cyberspace, are the FBI and NSA, with their agenda to tap every phone in America and make effective cryptography illegal.

Little wonder that in a Time/CNN poll, conducted eight days after the Oklahoma federal building blew up, 52 percent of respondents agreed that "the federal government has become so large and powerful that it poses a threat to the rights and freedoms of ordinary citizens."

—Levi Rizetnikof, with a tip of the hat to Brock N. Meeks and Jon Katz



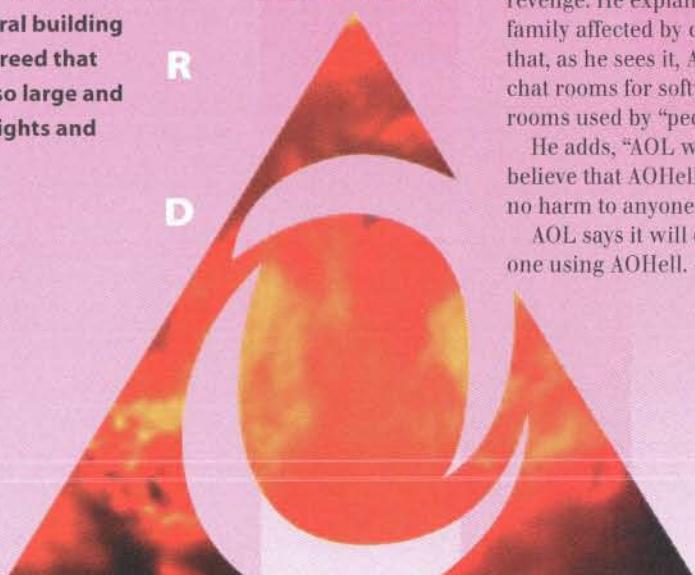
America Online foe Da Chronic is the mastermind behind AOHell, an outlaw program designed to exploit bugs in the online service, making it easy to forge messages in chat rooms, download files for free, and even create pirate accounts. To keep his identity secret, Da Chronic hides behind an anonymous remailer in Finland.

Da Chronic says he is a 17-year-old high school graduate in Pittsburgh, Pennsylvania, and claims he wrote AOHell for one reason: revenge. He explains how he grew up in a family affected by child abuse: he's furious that, as he sees it, AOL's staff can shut down chat rooms for software pirates but permit rooms used by "pedophiles and child abusers."

He adds, "AOL would also like you to believe that AOHell is a virus. AOHell poses no harm to anyone except America Online."

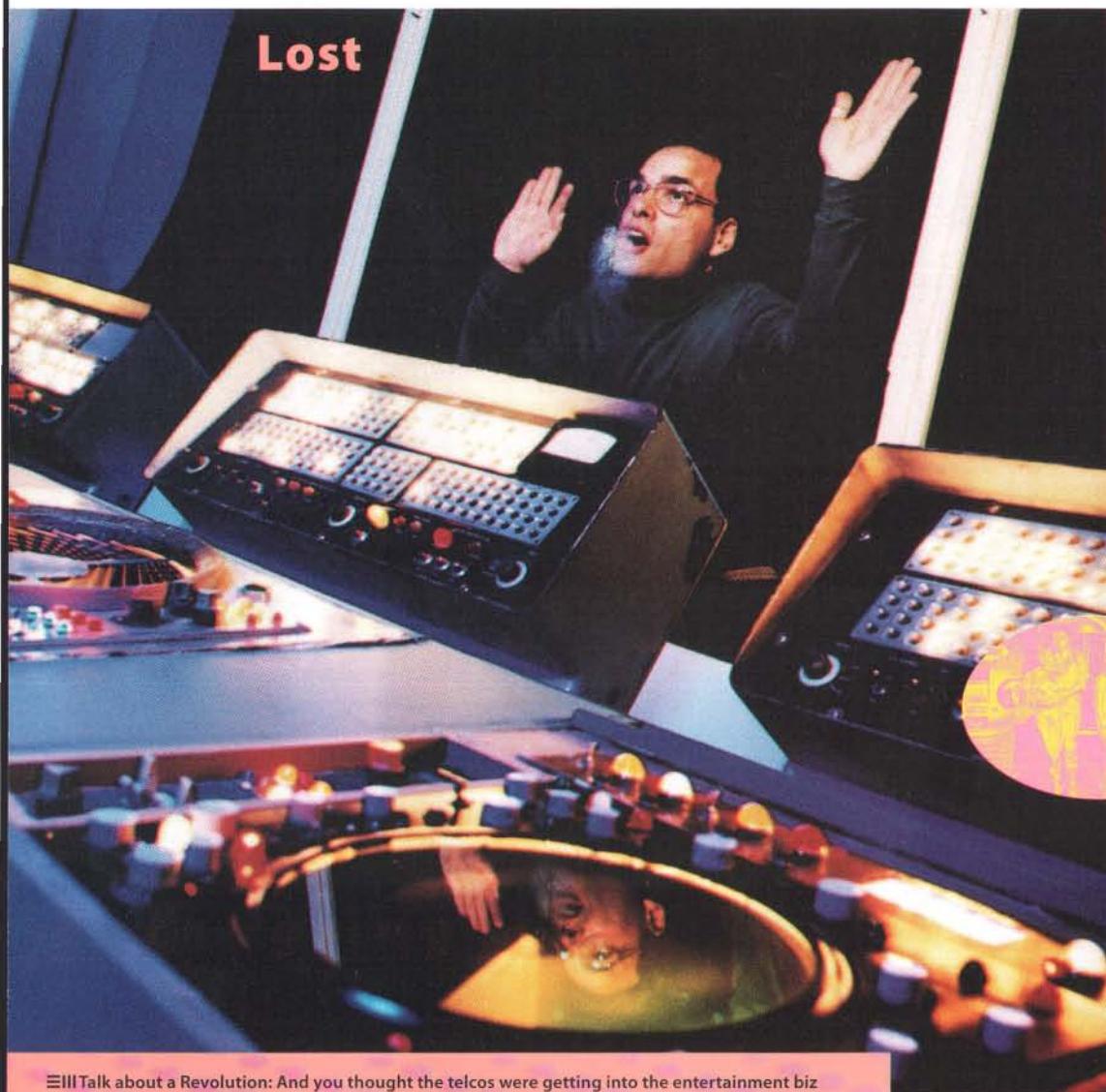
AOL says it will close the accounts of anyone using AOHell. —Simson L. Garfinkel

AOHell



in Jeff's Basement

Lost



Talk about a Revolution: And you thought the telcos were getting into the entertainment biz because they had stars in their eyes. Not really, folks. More like dollars to lose. A wave of Net-based telephony products (check out <http://www.vocaltec.com>) have the telcos' long-term seers shakin' in their recently deregulated boots. You heard it here first: the voice business is dead. Repeat: it's not even a commodity; it's doomed. The telcos know it, too. Why else are they rushing to change their

images, cut "content" deals, and hire old media barons like Stringer and Ovitz? Look for a complete report in an upcoming *Wired*. **Things Are Heating Up:** The Oklahoma bombing has fueled government hysteria about the evils of free speech (see "New Scapegoat: The Internet," previous page), but that's not the half of it. With the

FBI "reinterpreting" current regulations to investigate those it considers "potential ▶

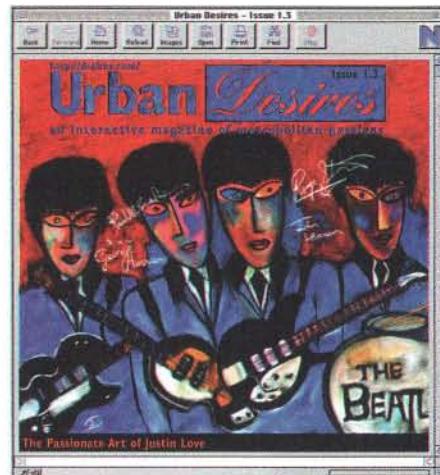
Entangling Alliances

Marc Andreessen, vice president of technology at Netscape, becomes rather petulant when asked why his company chose to invest in Terisa Systems last April. The alliance seemed odd because the two companies had been engaged in a heated battle over how to make the Net secure from eavesdroppers. Netscape was promoting a technique known as SSL, while

Terisa was backing S-HTTP. But according to Andreessen, the investment in Terisa was more of a public peace offering than a sign of surrender. "We didn't want to get involved in a pissing match," he insists.

Besides, combining the two standards makes sense. While S-HTTP secures only World Wide Web messages, SSL encrypts an entire conversation, whether it is Web or file traffic.

The result is a system that allows private messages — such as your credit card number — to be sent without fear of interception. And the implications are more significant than simply making life difficult for hackers. The Net is finally open for business. Terisa Systems Inc.: +1 (415) 617 1836, <http://www.terisa.com/>. — Steve G. Steinberg



I'm jealous of the sixth-grade students at Gladstone Atwell Intermediate School 61 in Brooklyn, New York. Their teacher has a spaceship in his basement.

And it's not just any old spaceship. Jeff Story, a 36-year-old math teacher and founder of the *Lost in Space* fan network Alpha Control, has reconstructed the cockpit of *Lost in Space*'s Jupiter 2 from the original props. He says he called "every prop house in Southern California" to find the components. Hundreds of hours and tens of thousands of dollars later, the complete cockpit is installed in his basement, "with about an inch to spare."

"When you look at it, it's like walking onto the Fox soundstage in 1968," beams a proud Story. For information about Alpha Control, e-mail: alphacontrol@delphi.com. — Mark Frauenfelder

We're trying to stretch the metaphor of what an online magazine is," says *Urban Desires* editor Kyle Shannon. The bimonthly chronicle of "metropolitan passions" has plenty of the sleek writing and design you'll find at any of your trendier newsstands. It also makes grunting sounds when you click on a Lance Ito reference and offers photographic "LoveGrids™" to romp through, as well as Tracy Quan matching wits with Camille Paglia.

Shannon, a New York actor and screenwriter who "does Mac stuff instead of waiting tables," launched the site late last year with his wife, Gabrielle, as a reaction to the glut of technology worship on the Web. "We thought it would be fun to put up a site that was just about culture," Shannon says. "It struck a chord."

Desires already has more readers than some glossies – averaging up to 100,000 hits a day. *Urban Desires*: <http://desires.com/>; e-mail: info@agency.com. – Mary Elizabeth Williams

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► terrorists," we'd do well to remember our history. When we approve broad powers for organizations with a proven track record of ignoring civil liberties, we do so at the expense of *all* our liberties. As one Net denizen put it: "The FBI and all the other three-letter spooks love the Oklahoma bombing and will use it to justify their piglike behavior. It is insulting for the government to even pretend the Bill of Rights means anything anymore. It should at least be honest and burn the original document on national television." **III We'll Do It Ourselves, Thanks:** While we're on a rant ... who would you rather have telling your kids what they can't watch — you or the government? ▶

Opening up the Closeout

Need to get something cheap, but don't have an uncle in the business who can get it wholesale?

Not to worry. So long as you're talking large quantities, all you need is International Closeout Exchange Systems Inc., a New York City firm that wants to be your high-tech mid-

deman. Started last fall, its membership consists of about 2,200 vendors and 15,000 buyers.

The company's online database matches buyers and sellers of closeouts — excess goods such as toys, clothes, and electronics sold for pennies on the dollar.

"We'll allow every little store and vendor to get connected," says the firm's co-founder and president Sam Mizrahi, an old-fashioned middleman himself. "And," he boasts, "we're going to put all those middlemen out of business." E-mail: ices@nyweb.com. - Ed Silverman



TIRED



WIRED

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Juliette Lewis
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Information Superhighway
NII
Clifford Stoll
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Penile augmentation
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Peanut butter
Silicon Tundra (Minnesota)
Howard Stern
Blockbuster in-store listening
As seen on TV
Postmodern

Floam
Massively parallel killers [sleeper]
Mia Kirshner
Movies starring Saturday Night Fever cast members
vBNS Supercomputer Net
GII
Sherry Turkle
Bellevue
Calf implants
Viatical settlement brokers
Nutella
Silicon Hillbillies (North Carolina)
Robin Quivers
IUMA at-home listening
As seen on MTV
Postconsumer

When Finnish sculptor Markus Copper was a child, he enjoyed playing videogames and watching movies like *Blade Runner* and *Alien*. Now, at 26, he's making his own monsters. Copper's most terrifying kinetic sculpture is Juggernaut, an enormous steel

And it won't stop until the battery is dead.

Copper says he's not concerned about injuring people. Accidents can happen, but folks know what they're about to face. Juggernaut is stored behind a steel fence in Helsinki, and anybody who wants to play with the

The Helsinki Killer Ball

ball that weighs as much as two cars. It has a motor, motion sensors, a juicy battery, and the mind of a psycho killer. It hunts you. If you don't jump aside, you'll be trampled under it.

killer ball must unleash it first. The message is obvious: this experience might just take your life.

Copper's next project? "Bombs. I want to make bombs." — Panu Ratty

bandwidth over cable. All that remains to be seen is how much it plans to charge for that pipe. ■■■ A Commons Waiting for a Tragedy?: A few hundred residents of The Well, the quintessential online community, have broken ranks and organized into "an open, uncensored, user-owned, user-governed, economically self-sustaining virtual community." ▶

SurfWatch Software thinks so, too. Its new software lets parents and educators block out the "more than 250 Internet newsgroups which include topics on bestiality, bondage, pornography, and pedophilia." One problem: Surfwatch, not you, decides what's worth blocking. More details: info@surfwatch.com. ■■■ Don't Touch That Remote: Take note, kids: the cable/telco war is finally getting real. With the formation of @Home, TCI has committed to bringing its subscribers 10 Mbps

Web Site of Champions

ESPN SportsZone could become champion of the online sports world. Kicked off in early April, SportsZone is the Web-based progeny of ESPN and Starwave (the firm of Microsoft co-founder Paul Allen).

Combining ESPN's sports-media content with Starwave's technology background — along with Allen's additional holdings, Ticketmaster and STATS Inc. — SportsZone offers up-to-the-minute sports coverage, including articles and photos, discussion

threads, and libraries of sports statistics. In the future, look for audio and video clips, data-driven graphics that track the progress of a game in real time, and ticketing services. SportsZone will follow a magazine business model, relying on subscription and advertising revenues. It is expected to be available through the Microsoft Network, launching in August. ESPN SportsZone: <http://espn.sportszone.com>. — Jessie Scanlon

**ESPN
SPORTSZONE**



Gigantor with Attitude

BattleTech began as a board game in 1985 and quickly worked its way into almost every available medium: toys, cartoons, a forthcoming feature film, novels, location-based entertainment parlors, and of course, personal computer games.

Activision's *MechWarrior 2* CD-ROM offers a 3-D, texture-

mapped *BattleTech*-like world that's rendered on the fly. The US\$60 release pits players against computer-controlled robots stomping over post-apocalyptic cities, deserts, and ice canyons. An upgrade in the fall promises a multi-player version. Activision: +1 (310) 473 9200.
—Mark Frauenfelder

►Their purpose? To create a place for good conversation free of Net noise, flashy graphics, and commercialism. Each of the 300 members would pay US\$100 to open the service and become a voting member of the cooperative. Dubbed the The River, the service would offer unlimited Net access for an additional \$20 a month. To inquire: info@river.org. **III** Players: DreamWorks SKG (that's Spielberg,

Katzenberg, and Geffen, for those returning from three months in the Arctic) has had a few naming

problems of late. Number One: A Florida movie promotion company called Dreamwerks Production Group is suing SKG for stealing its name — to the tune of \$25 million. Number Two: SKG forgot to register "dreamworks.com" with InterNic, and some other net.smartypants now owns it. Ah, the price of names. **III**

Online service watchers use clichés like "the boat is leaving the dock" to describe GEnie's also-ran status. Changes unveiled in April were intended to reposition GEnie against America Online and CompuServe by targeting user groups and BBS communities to build membership. GEnie also cut surcharges and promised an easier e-mail system to woo users.

However, says Alfred Grossbrenner, a longtime GEnie user, the company can't hide from a track record of announcing new services and not following up. Downloading its new front-end requires 90 minutes at 2400 baud. "GEnie's been dead in the water for the past year or more," he says.

Confidence has plummeted even further — caused by persistent rumors of GEnie's sale and by the departure of president Mark Walsh, who jumped ship for — gasp! — AOL. —David J. Wallace

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Spreading the Blues

The House of Blues is probably the only nightclub and restaurant chain in America where wall-mounted monitors providing a view of the stage sometimes display a company Internet address as well.

If that sounds odd, it's only because some people see restaurants exclusively as places to eat and drink. Food is served in the three clubs up and running so far (in New Orleans, Los Angeles, and Cambridge, Massachusetts) but



House of Blues: It's about content, baby.

these are just the most visible part of a content-driven media empire.

House of Blues Entertainment Inc. co-produces a weekly TBS television show and runs a syndicated radio program hosted by company investor Dan Akroyd. The House of Blues Music Company has signed five artists and is also releasing blues compilation albums.

E-mail addresses flash on monitors because House of Blues New Media Vice President Marc Schiller is using edge technologies to bring multimedia created at the company's clubs to a wider audience. He plans to provide live programming on the company's advertising-supported Web site, and he's also toying with launching a House of Blues CD-ROM magazine, to be sold in House of Blues retail stores.

"The corporation is creating an incredible amount of content," Schiller says. "You can license out some of that content and take a passive role, which really doesn't create good products, or you can take an active role in designing those products."

Schiller says this over lunch at the Los Angeles club, one of the few buildings boasting both a corrugated tin façade and multiple ISDN lines.

Former movie producer and entertainment consultant Schiller was working as a technology consultant when, last year, he was hired by House of Blues founder and CEO Isaac Tigrett for the new media division.

Tigrett "understands brand identification like I've never seen before," Schiller says. Tigrett got the know-how by

launching the Hard Rock Cafe in London at the age of 19, then taking it worldwide. At 46, he's now building the House of Blues brand name, and seems genuinely excited about bringing it into cyberspace. "To me, new media is the most important thing happening today," Tigrett says.

The House of Blues's new media ventures will work synergistically with its other divisions. An interview with John Lee Hooker, conducted for the House of Blues radio program, could be reprinted on the Web site. And club goers could use the site to collect info about their favorite bands.

Still, the House of Blues is more interested in live "Netcasting" than using the Web to promote its other products.

"Live programming is going to be key for us," Schiller says. "What the Web allows you to do is communicate with the artist, participate in the creation of the art, interact with the programming as it happens. The real capability of the Web is to take a kid in London and hook him up with a kid in Spain and have them create something together or jam with a musician. And who's going to do that? We are." House of Blues: +1 (213) 650 0476. Web: <http://www.houseblues.com>. — Rob Levine



A Clean Way to Shovel Dirt

Earth-moving equipment manufacturer Caterpillar Inc. is testing new machine designs by operating them in cyberspace. Using WorldToolKit software developed by Sense8, operators sit on a platform situated within a large cube. Stereo images are displayed on the cube's walls, allowing the operator to assess the view from the cab and test the maneuverability of the virtual vehicle. Sense8: +1 (415) 331 6318, fax +1 (415) 331 9148. E-mail: info@sense8.com. — Mark Frauenfelder

Truckin' through the '60s

Haight-Ashbury in the '60s is the first CD-ROM effort from Rockument Inc., a multimedia firm in Gualala, California, whose mission, according to president Tony Bove, is "to warp technology into a rock-and-roll machine."

Haight, to Bove and crew's credit, is no dewy-eyed whitewash of the time when a San Francisco street corner was the center of the anti-establishment world. "We're not censoring anything. We can't go putting fig leaves on people's bodies," says Bove, who also directed and co-produced the CD-ROM. "A lot of the material here could be considered radical. We're talking about a movement that involved freedom of speech."

Bove and *Haight* associate director and co-producer Cheryl Rhodes have the computer and counterculture cred for the venture. The founders of *Publish* magazine, as well as the authors of several books on multimedia, they grew up in the era they're chronicling. "I came out of the '60s clearly a counterculture person," say Bove.

"It's the old home-brew computer club mentality," notes Rhodes. "I'm also a music lover and a music fan. It was exciting to me to be able to research this area in more depth."

After years in the field of journalism, Rhodes says the idea of moving from writing about technology to making it had been at the back of both of their minds for several years. When the CD-ROM industry started to explode in the early '90s, "we just couldn't sit back and do nothing," she adds.



Rhodes and Bove: The Owsleys of multimedia.

An unflinching, nonjudgmental chronicle, *Haight* is divided into three parts: Turn On, Tune In, and Drop Out. Of course. With Tune In, you can search through snippets of the CD-ROM and assemble them in a "roll-your-own" format. Turn On is "The Rise and Fall of the Haight-Ashbury," written and narrated by former *San Francisco Oracle* editor Allen Cohen. The section includes excerpts from the notorious underground paper in all its glory, as well as archival

Wired Top 10

Stolen Cars: the least- and most-stolen makes on the market

Most Stolen	Result	Least Stolen	Result
1. Mitsubishi Montero (4-door/4-wd)	1815	Saturn station wagon	11
2. Toyota Land Cruiser	1729	Plymouth Colt Vista wagon	15
3. Mercedes S Class (convertible)	1517	Buick LeSabre (4-door)	16
4. Mercedes S Class LWB	1437	Ford E-150 Club wagon	17
5. GMC T15 Jimmy (2-door/4-wd)	1023	Renault Summit wagon	19
6. Mercedes S Class SWB	777	Chevrolet Cavalier wagon	20
7. Acura Legend (2-door)	759	Buick Regal (4-door)	21
8. Lexus GS 300	754	Subaru Legacy wagon (4wd)	22
9. Nissan 300ZX	676	Saturn SL (4-door)	23
10. Nissan Pathfinder (4-door/4-wd)	602	Mercury Topaz (2-door)	24

Results are based on analyses of insurance coverage and claims data for millions of 1992-94 passenger vehicles. The results are relative, with 100 representing the average for all cars. A result of 174 would be 74 percent worse than average; while a result of 58 would be 42 percent better than average. The higher the figure, the worse the losses. Source: Highway Loss Data Institute. +1 (703) 247 1600.

- Gareth Branwyn

"the '60s, but it makes sense to start at the beginning," says Bove. "I see a progress from the media experiments in the '60s to the experiments in television, video, and film in the '90s. There's a direct lineage from hippies to hackers." And where they meet is the most famous intersection of all time. Rockument: +1 (707) 884 4413, <http://www.rockument.com>. - Mary Elizabeth Williams

X-Ray Spex

Arie Kaufman, a computer scientist at the State University of New York at Stony Brook, likes to say that whenever he steps into his lab, the experience is akin to "discovering a new continent."

It's less a continent and more another dimension; Kaufman is a pioneer in volume visualization (VolVis), a technology that takes 2-D data from CAT scans, MRIs, PETs, and X-rays and renders them as 3-D images. VolVis's users can then, on screen, peel the outer layers of the brain, search for tumors, change the angle of view, or magnify areas of concern, all without touching a scalpel.

The implications of the technology are staggering, from medical applications to environmental science to national defense to entertainment. Already, VolVis is enabling researchers to see inside the brain in greater detail than ever before, to delve into the cells and synapses that make thought and memory possible, to concoct more realistic flight-simulation programs, to measure ground-water flows, and to search for oil reserves.

And all this is just the tip of the arithmetic. VolVis relies on a series of algorithms to simulate "ray tracing": how particles

footage featuring the luminaries of the scene, set to the music of the Grateful Dead and Big Brother and the Holding Company. After boning up on history, you'll be ready to Drop Out with a game that takes you to the Haight on a quest for enlightenment.

Though some will wonder at the relevance of yet another look at this decade, Rockument's leader recognizes the importance of cultural context.

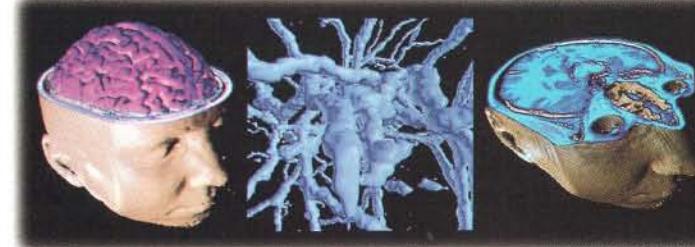
"We're not stuck in

in a volume emit, absorb, or refract light. The process works by taking an object, already traditionally represented in triangles (these then form 2-D images), and translating it into volume elements called "voxels." When individual rays pass through each voxel, the data are accumulated and displayed on screen. With VolVis, you can get the inside scoop on just about everything.

Since Kaufman's university does not budget for research, he's had to turn to other sources. The National Science Foundation and the US Department of Energy each awarded him US\$100,000 for volume visualization research.

On the Stony Brook campus' Howard Hughes Medical Institute (no affiliation to Hughes Aircraft), volume visualization is used to analyze the circuits within brain cells. Says Paul Adams, a Hughes researcher, "We're gearing up to look at one of the central questions in neurobiology: Where is memory stored? This is a 3-D question. You need a technique that allows you to look for small changes in many parts of the brain simultaneously. VolVis is playing a key role in this. For us, it's vital that this tool has come along."

But the MIPS-greedy VolVis will have to be souped up if it's to out-maneuver 2-D surface-based visualization systems. At Brigham and Women's Hospital in Boston (an affiliate of Harvard University Medical School), both techniques



With Volvis, you can get the inside scoop.

are used to detail patients' anatomies before, during, and after surgery.

"Whether or not volume-based systems are better isn't clear," says Bill Lorensen, a graphics engineer with GE who has been working with doctors at Brigham for seven years. "As for surface-based systems, you can always see one surface, but you can't see through it, so it's not clear what surface is in front of another. Similarly, with an X-ray, it's hard to see one surface behind another. The volume techniques can't produce images as quickly, so Brigham and Women's, for now, is using both, although surface-based systems win out because they're faster." But Kaufman expects VolVis to improve over time. "Even now we can see that this technology will revolutionize the field of computer graphics."

VolVis software, instructions, manuals, and conversion utilities are available to researchers free of charge over the Internet (volvis.cs.sunysb.edu). - Adam Penenberg

Asia.net

It's no secret that expatriate Chinese students used fax machines to funnel information in and out of China during the 1989 democracy movement. Less well known is the fact that China's turmoil gave birth to what is now one of the most vigorous communities on the Internet. Mailing lists, newsgroups, and ftp archives proved to be superb methods for distributing information



*"What I need is
a pint-size notebook with a
full-size keyboard."*



*"Yeah, and make
the screen big enough so
I don't go blind."*



*"That's all fine, but it
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Custom Peepers

A Japanese optician chain is offering custom-made eyeglasses based on the shape of the customer's face. A system consisting



AsiaInfo: Stoking China's Internet fever.

of color scanners, image software, and an eyeglass production unit is integrated within a local area network in each Miki Cycglass boutique.

A digitized image of a customer's face is analyzed by artificial intelligence software developed by Siemens Nixdorf in Germany. The system then displays the customer "wearing" a suggested pair of glasses. Once a pair is selected, it's made on the spot. The system has been installed in Japan, Australia, France, and Germany, with an additional 500 systems to be installed in Japan. Siemens Nixdorf Informationssysteme AG: +49 (89) 636 41325.

—Mark Frauenfelder

to the many far-flung pockets of "overseas" Chinese.

The most enduring cyberlegacy of the Tiananmen Square incident is the China News Digest, a web server (<http://www.cnd.org>) and mailing list that routinely figures in the top 10 most popular listserve lists (see "Top 10," *Wired* 2.11, page 46). The Digest was started by a group of Canadian and American expatriate Chinese students to spread news about the Tiananmen demonstrations. Six years later, tens of thousands of subscribers receive a daily synopsis of news stories about China published in newspapers and magazines from all over the world.

One of the volunteers from the group that produced the Digest, James Ding, soon recognized that the Internet could be turned to different, more profitable uses. Along with other expatriate Chinese, Ding founded **AsialInfo Services Inc.**, in 1993, a joint venture with China's largest information retrieval company, Wanfang Data Corporation. AsialInfo's original mission was to transmit — via the Internet — business-oriented information about China. But over the last six months, the company has become increasingly involved in getting China online.

"China has got Internet fever," says Edward Tian, AsialInfo's president, in an e-mail message from Beijing, where he and Ding "are working like crazy to have many Chinese institutions linked to the Net."

AsialInfo is also a "major" subcontractor for Sprint, which is setting up three leased 64-Kbps lines to the Internet in China. And with a content provider in the United States and a technology provider in China, AsialInfo hopes to become a full-fledged online service provider.

These days, there's no shortage of companies with similar plans in Asia. Hong Kong alone has 10 Internet providers — six months ago, there were three.

But the real irony of the AsialInfo case is that the same people who smuggled information out of China when the government was doing its utmost to stop them are now helping set up that same government with the most potent information-dispersal technology around. So far, they're being discreet, capitalizing on the observation that either Chinese leaders don't know enough about the Internet to fear it, or that they're so blinded by the economic need to upgrade telecommunications, they're ready to write blank checks. —Andrew Leonard

Canvas Catastrophes

Antiques dealer Scott Wilson spends a lot of time fishing through thrift stores and junk sales around Boston and comes across a lot of really awful art. A couple of years ago, Wilson found a gem of a bad piece and brought it over to his friend Jerry Reilly's house in West Roxbury, Massachusetts. The huge oil painting was titled *Lucy in the Field with Flowers*. It was "a beautiful painting of an old lady with blue hair, standing — almost hovering — in a field of daisies," recalls Wilson.

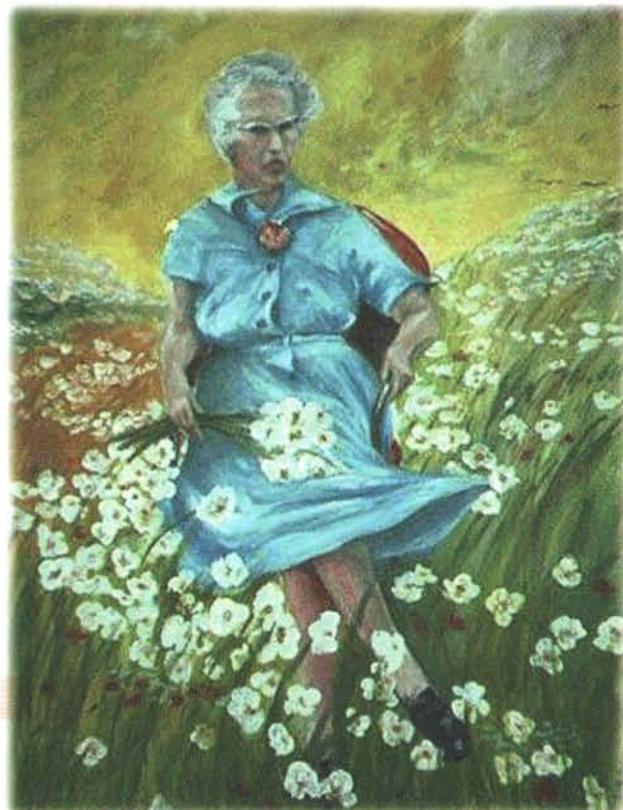
"There was something about it that was just hideous," says Reilly, a computer programmer, "but in a really striking way. It's breathtakingly bad. You could tell that the person

who painted it was technically proficient, but something had gone horribly wrong."

Reilly, who spends every summer in Cape Cod living in a tent full of computers with his screenwriter wife, asked Wilson if he could hang *Lucy* in his home. Wilson gladly accepted. "I started giving him more and more bad paintings," he says. Nine months later, Reilly had so many horrible paintings in his house, he and Wilson decided to share their collection with the public. "I turned my basement into a museum," Reilly explains. "We painted the walls white, added track lighting, framed the paintings, wrote little blurbs for them, and called it the **Museum of Bad Art** (MOBA). Then we invited a pile of people over. That was the start of it all."

It didn't end there, of course. Reilly and Wilson had more shows, each with new pieces Wilson had rescued from yard sales, thrift stores, flea markets, attics, and trash cans. As MOBA's curator, Wilson is very particular about what gets hung on the walls. You won't see velvet Elvis paintings or intentionally primitive "folk" art. "We don't go for kitsch," he explains. "The paintings are all inspired, genuine attempts at something. There's a lot of passion in them, but something ran amok. As a result, they need to be seen." Thus, MOBA's motto: "Art too bad to be ignored."

Reilly's suburban home quickly became the hip local

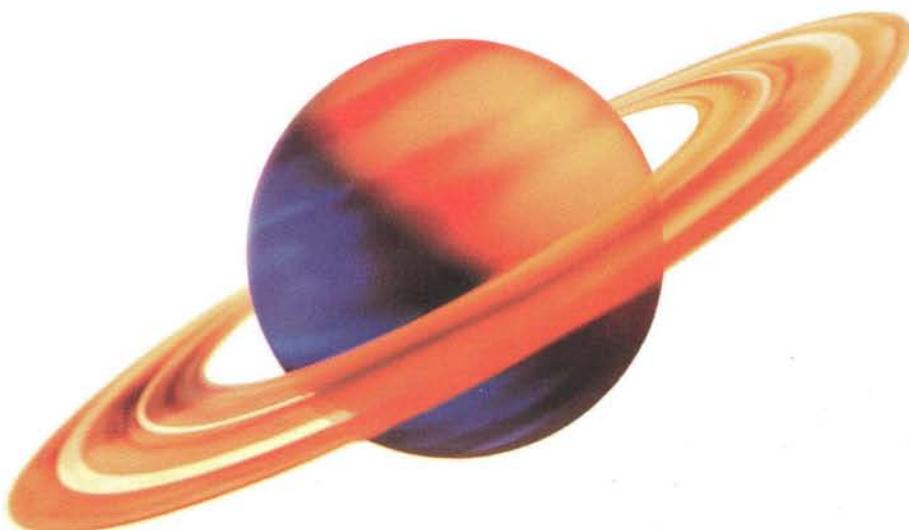


MOBA's *Mona Lisa*: *Lucy in the Field with Flowers*.

hangout of West Roxbury, attracting mobs of people on show nights. Strangers began donating paintings they'd found. MOBA's last show in January, "Bright Colors/Dark Emotions," was a complete zoo. "It's a small house, and there were hundreds of people," Reilly says. "We'd put paintings on the whole outside of our house, and it was so crowded you couldn't get in. We hit the limit."



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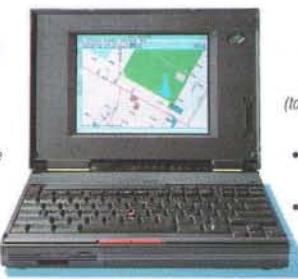
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WOLLONGONG

At that point, it was no longer practical to keep the museum in Reilly's basement. A meeting was called with the Friends of MOBA (a loose connection of 80 or so of the museum's hard-core fans) to figure out what to do. They came up with two plans. First, they decided to set up temporary MOBAs in larger galleries and museums around town. They also started making a CD-ROM. The friends of MOBA began pitching in. One member put them in contact with a photographer's studio in Boston. Another who owns a small software business agreed to help distribute the CD-ROM through her company. Somebody else is a film producer, so she brought in costumes and props. The CD-ROM is full of chatty, outrageous characters (played by the Friends of MOBA). You can visit the lobby, café, restroom, and gift shop, or sneak past the "No Admittance" signs to explore the offices, shipping dock, and restoration rooms. "Other art CD-ROMs we've seen are sterile – a bunch of empty rooms with paintings," says Reilly. "Half the fun of going to a real museum is eavesdropping on people."

Jargon Watch

Bambi

What game- and talk-show staffers call someone who freezes in front of the camera (like a deer caught in headlights).

Batmobiling

Putting up an emotional shield just as a relationship enters that intimate, vulnerable stage. Refers to the retractable armor covering the Batmobile.

Cyber Noir

Used to describe dark, trippy, weird "cyber" films and shows like *Wild Palms*, *Tank Girl*, and *VR.5*.

Gutter Tribes

Nomadic bands of homeless people in their teens and early twenties who travel from city to city, making their living primarily through panhandling.

In the Plastic Closet

Said about someone who refuses to admit to having cosmetic surgery. "Is Tori Spelling in the plastic closet, or what?"

Triple-dub

An abbreviated way to say "WWW" (double-yew, double-yew, double-yew) when speaking a URL. "Hey, check out this cool Web site at triple-dub dot neowobbly dot com."

Value-Subtracted Reseller

A company that buys components from other companies and puts them together in a system that's less than the sum of its parts. Opposite of value-added reseller.

Waitbuster

Checkout-counter displays that entice you to buy, buy, buy while you wait. (Also called a "shelftalker.")

— Gareth Branwyn (jargon@wired.com)

Tip o' the tiara to: Jerry Dunn, Gavin Ivester, Kevin Kelly, Mikki Halpin, Michael Gold, Jef Poskanzer, and Marjorie Ingall.

What is it about bad art that has made MOBA a success? Reilly has a theory: "Because it's the Museum of Bad Art, people aren't afraid to give their opinion. In fact, they talk passionately about the art. You never see that in a regular museum."

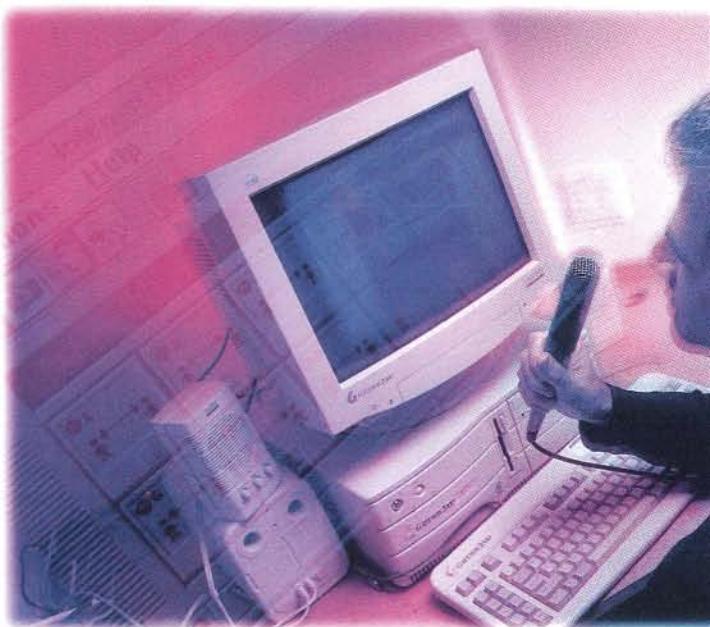
MOBA: +1 (617) 325 8224. On the Web: <http://mirror.wwa.com/mirror/orgs/moba/moba.htm>. — Mark Frauenfelder

a cheap, local phone call to your Internet provider.

That makes the program a godsend for anyone in a long-distance relationship. But while a few people use iPhone as a cheaper way to reach out, right now, its main use is as a telephone chat line – a place for people to hang out and talk with strangers.

My inaugural iPhone call was fairly typical. The program first connects to a central directory of people who are hooked up and willing to talk. I scrolled through the list, clicked on a name at random, and, suddenly mike-shy, stammered my hello. After a short pause, the voice of Tom from St. Louis emerged from my computer. It was exciting at first, a faint echo of how Alexander Graham Bell must have felt when he called Watson. But after Tom and I exchanged weather information, and talked about how cool iPhone was, our conversation petered out.

It was a far cry from the playful and often surprisingly personal conversations I've had on IRC and MUDs – an impression other



Internet Phone: Hamming it up on the Net.

iPhone users echo. "IRC allows you to get a little more substance," agrees Alice, a longtime iPhone user. "Voice is more personal; people kinda freeze." The old joke that no one knows you're a dog on the Internet doesn't hold true anymore.

Of course, not everyone misses the intricate wordplay and flights of imagination found in the ASCII world. Tom, for one, believes iPhone's growing popularity stems from the fact that "you don't have to be a literary genius like you do on IRC" to communicate effectively. And some people find voice flat-out superior. Jimmy, an aerospace engineer in California, brags he's dated two girls he met through iPhone thanks to his "silver tongue." And Alice, who has the use of only one hand, says iPhone can make the Net a whole lot more accessible to the disabled.

Perhaps the sea change iPhone reflects is that the Net is no longer just for shy hackers who prefer typing over communicating face-to-face. Indeed, iPhone users speak excitedly of how this is just a teaser for what's to come: real-time video. They're undoubtedly right. But, as embarrassingly retro as it sounds, I wonder whether more bandwidth will allow us to communicate better. VocalTec Inc.: <http://www.vocaltec.com> or +1 (201) 768 9400. — Steve G. Steinberg

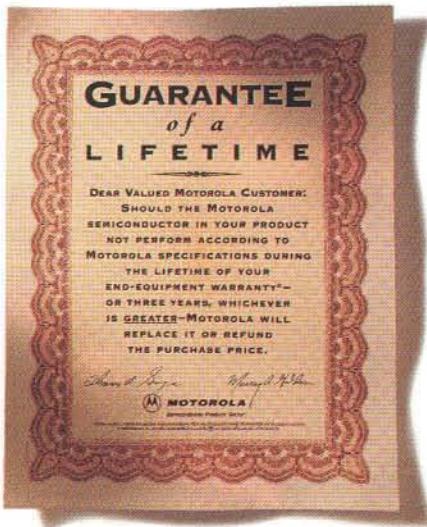
iPhone: More Is Less?

They used to say the problem with ham radio is that the only people you can reach are other hams. That adage came to mind when I first tried Internet Phone (or "iPhone" as it's known among aficionados), a new program from VocalTec that does pretty much what the name suggests: it allows you to talk in real time with other people on the Internet. The system won't replace AT&T any time soon, but exploring the booming iPhone community provides an intriguing preview of where the Net is headed.

iPhones, along with a growing number of competing programs, work like this: you speak into a microphone connected to your computer, and the software then compresses your voice, shipping it across the Internet to the receiving computer where it's played. Voice quality ranges from the slightly muffled sounds of a speakerphone to the near-gibberish of a New York subway announcement. But hey, you get what you pay for – in this case,



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Introduced at the Chicago world's fair back in 1893, the Blickensderfer was then a state-of-the-art word processor. The first portable typewriter to offer interchangeable fonts, the "Blick" also boasted inventor George Blickensderfer's proprietary "scientific" keyboard layout, his "improvement" over the QWERTY layout. (Upon request, you could get the QWERTY design, but you first had to sign a release stating you'd been warned that QWERTY was inefficient.) You can buy your very own beautifully restored Blick - and other steampunk office equipment - from This Olde Office. Blickensderfer typewriter: US\$595. This Olde Office: (800) 246 8558, +1 (619) 328 7876.

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Anchor Industries Inc.: (800) 344 5110, +1 (616) 946 2760.

FETISH

Edited by David Jacobs

This Sucker Blows

I can't help it: I refuse to buy those cans of pressurized air used for blowing dust off camera lenses and computer equipment. I don't like the idea of paying for air. The miniature Electric Duster from Metropolitan Vacuum Cleaner Co. is more my style. This AC-powered, 1/2-horsepower unit is designed to remove dust, lint, and debris from keyboards, camera lenses, and other delicate equipment with good, old-fashioned free air. The Electric Duster: US\$49.95. Metropolitan Vacuum Cleaner Co. Inc.: (800) 822 1602, +1 (914) 357 1600, fax +1 (914) 357 1640.

Use Your Head

I've always wanted to videotape my biking, skiing, and motorcycle adventures. But hey, I've only got two hands! Just when I was about to search for a sympathetic genetic-engineering lab, I heard about HeadTrip, a "look, no hands" videocam system designed for nuts like me. The 3-ounce color camera attaches to a headband or optional helmet mount, and the 4.5-pound recorder and monitor fits in a fanny pack. I might even start wearing this around town - who knows, a Hard Copy scoop could be just around the corner! HeadTrip: US\$4,200. HeadTrip Inc.: (800) 443 2387, +1 (303) 827 4288.

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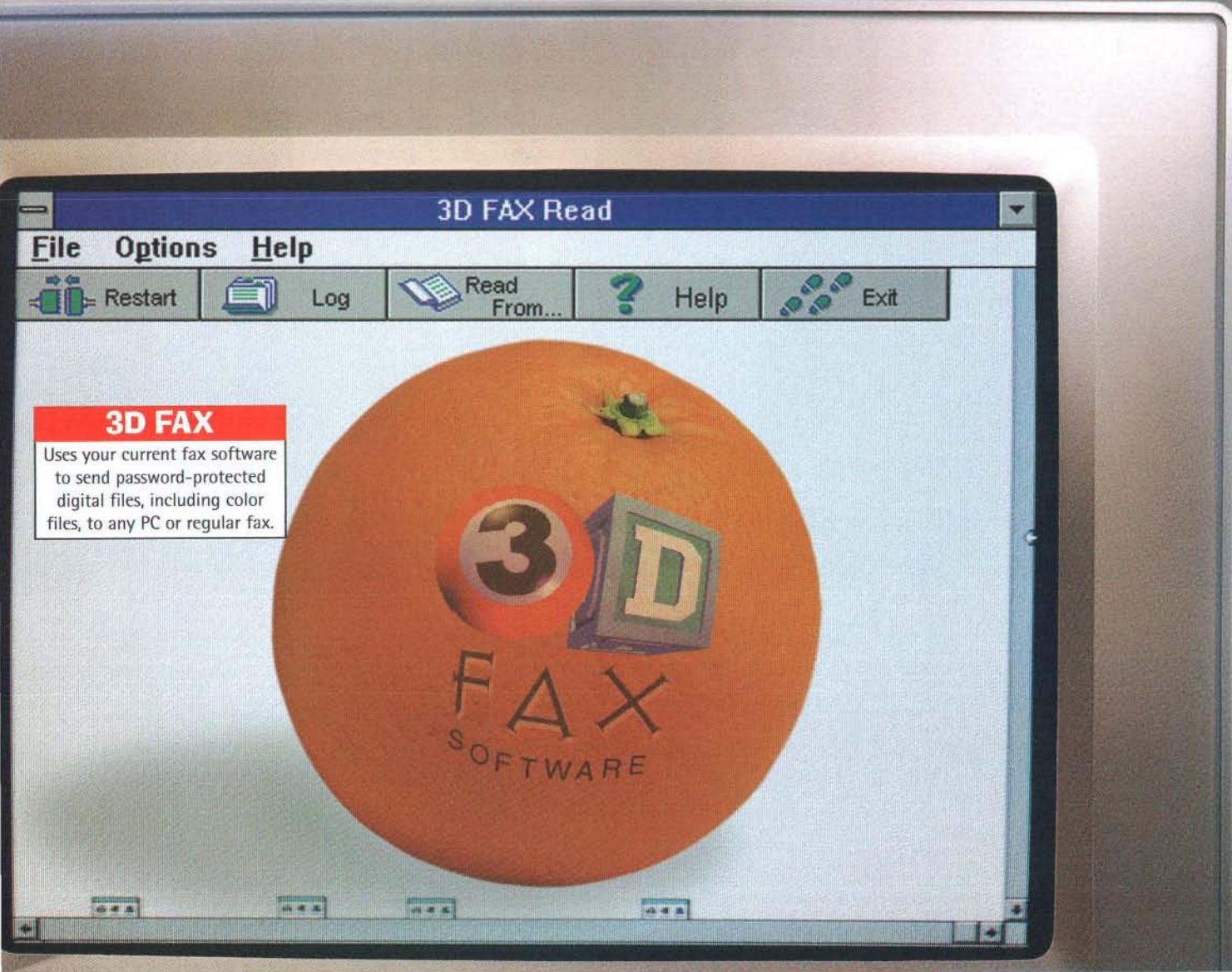
SYSTEM REQUIREMENTS: 386 or higher PC, with 4MB available memory, running Windows® 3.1 or higher with fax capabilities, including a fax application such as WinFax™, FaxWorks™, etc., VGA display, 3.5 inch high density diskette drive, a minimum of 1.5MB of hard disk space for the software installation and about 10MB hard disk space for optimum operation. © 1995, Infomaging Technologies, Inc. 3D FAX is a trademark of Infomaging Technologies, Inc. Windows is a registered trademark of Microsoft Corporation. All other trademarks are properties of their respective owners. 3D FAX is protected by U.S. patent.

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Do you like to bring along plenty of "boy scout water" on camping trips to make sure you can start a fire, no matter how wet the conditions? Next time, keep the starter fluid at home, and use the Solar Capsule Cooker instead. Fill it with up to 6 cups of liquid, meat, or veggies, and stick it in the sun. On a bright day, the temperature inside the cooker can reach up to 300°F, but the outside remains cool enough to handle. The 9-pound, 48-inch, solar-powered cooker comes with a stainless steel end-cap that doubles as a drinking cup, and the shoulder sling makes it easy to haul around. Solar Capsule Cooker: US\$169. Sun-It Enterprises: +1 (619) 728 5254.

Notebook Origami

Do computer manufacturers really believe your hands shrink when you go on the road? With those tiny keyboards they put on their laptops, they must. IBM's solution is the ThinkPad 701C. This baby's keyboard automatically expands from the center as you open the case, providing ample finger room. ThinkPad 701C: between US\$3,700 and \$5,600 depending on the configuration. IBM: (800) 772 2227.



Gobs o' Gigs

Attention all well-heeled artists, digital designers, and out-of-control GIF freaks: Sony's new WDD-531 optical drive will give you all the storage you need (at least until holographic digital video comes along). Each WORM (write-once, read-many) disk holds a whopping 15 Gbytes. Not enough, you sniff? Then try the 76-disk, ▶ WDA-550 jukebox, which will organize and store over 1 Tbyte of info. WDD-531 disk drive: US\$21,000. WORM disk: \$410. WDA-550 76 disk jukebox: \$112,500. Sony Electronics Inc.: (800) 222 7669.

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Now you can e-mail around the globe; track vehicles, equipment, or livestock; and monitor polluters and poachers ... all from the comfort of your own personal ▶ satellite! AeroAstro's Bitsy weighs only 2 pounds and is about the size of a bloated PDA. This itty-bitty bird is packed with onboard processor, GPS receiver, pointing-and-tracking system, camera, radio, and power supply. Educators, business people, and rich dilettantes are all likely customers for the satellite, which is 0.1 percent the cost and weight of its more conventional neighbors in the ionosphere. Bitsy: US\$100,000. AeroAstro: +1 (703) 709 2240.

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Choosing a travel camera just got a lot easier. The hand-sized Minolta Freedom Explorer, the world's smallest 28-70mm zoom camera, allows you to shoot both panoramic scenes and portrait shots without a lens change. It has all the features you'd expect from a modern camera (built-in flash, autofocus), and, weighing in at only 9.25 ounces (with battery), it stashes neatly in your shirt pocket. With a camera this size, you'll be snapping everywhere you go.

Minolta Freedom Explorer: US\$308. Minolta: +1 (201) 934 5308.



Bye Bye, Beige

In the late '40s, The 3M Corporation ran a series of tests to find out how colors in the office affected worker productivity. It turns out a beige office is an efficient office. But I'm sick of beige! I use my computer a lot at home, and the color clashes with my cool digs. I want the new black AcerAcros PC. This Goth baby comes with a Pentium under the hood, screams along at 75 MHz, and has a built-in 14.4 Kbps modem. Gimme gimme. Black AcerAcros: US\$1,999. Acer America Corporation: (800) 368 2237, +1 (408) 432 6200.

Power Shower

The Home Cinema Monitor is just one reason Rock Solid is the fastest-growing loudspeaker brand in US history. The Monitor's plate-metal components and plastic-coated drivers allow you to stick it anywhere—in the yard, by the pool, or even in the shower. The Monitor is magnetically shielded, and the 1-inch ferrofluid-cooled tweeter and 5-inch woofer can handle up to 150 ear-splitting watts of power. And don't worry about damage from overload; you can crank it all the way up, because Monitor's fast-acting thermal switch will shut down before any damage is done. The Monitor: US\$199. Rock Solid Sounds: (800) 370 3742, +1 (508) 664 3406.

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The Future of Holography

You've heard the hype. We asked the experts. Here's the real timetable.

Almost 50 years after holography was invented by Dennis Gabor, a Hungarian physicist who later won a Nobel Prize for his discovery, holograms can be found inside wallets worldwide. Simple holograms, such as those on credit cards, are created by shining a laser on an object and recording the reflection onto special film.

While virtual reality may be grabbing the media's attention, startling advances in holography are promising to bring true-color 3-D images into our homes and hospitals. And you don't need bulky headsets to see them. *Wired* asked several leading experts to put the future of holography into focus. —David Pescovitz

Stephen A. Benton

PhD, Allen Professor of Media Arts and Sciences, Spatial Imaging Group, Media Lab, Massachusetts Institute of Technology

Mark Diamond

founder, Diamond Images Inc.; creative director and vice president, 3-D Worldwide Holograms Inc.

James Fischbach

president and CEO, American Propylaea Corporation, a commercial holography developer

Tung Hon Jeong

professor of physics and director of the Center for Photonics Studies, Lake Forest College

Emmett Leith

PhD, professor of electrical engineering and computer science, University of Michigan

	Holophone	Holoprinter	Holographic Medical Imaging	Holographic Storage	\$1 billion Industry
Stephen A. Benton	2000	2000	1998	2000	2010
Mark Diamond	2015	1999	2010	2020	2001
James Fischbach	2020	1995	1996	2005	1998
Tung Hon Jeong	2005	2005	1996	2005	2005
Emmett Leith	2050	2020	2020	2015	2015
Bottom Line	2018	2004	2004	2009	2006

Imagine a phone that displays a 3-D image so realistic it's as if the person you called is sitting next to you. Our experts agree that the biggest barrier to such a holophone is the tremendous amount of bandwidth required to transmit real-time 3-D images. Their solution? Fiber optics. Once that hurdle is crossed, Diamond

thinks proposed "intelligent" optical materials will operate on both ends of the fiber-optic cable. Such materials will efficiently encode and decode holographic images, he says, eliminating the need for powerful computers. Benton points out that two years ago, the MIT

Media Lab sent a hologram through 70 meters of coaxial line, but he also believes the first holophones are likely to employ improved "lenticular imaging," the quasi-holographic technology used on cheesy 3-D postcards.

Most of our experts predict that a printer capable of producing instant holograms of onscreen images will be available within the next decade. Leith and Benton expect the printer to use liquid crystal displays to expose holographic film to light, a technique already demonstrated at the MIT Media Lab. Diamond notes that

companies in Holland and Japan also are working on prototypes. He notes that such a product "already has a built-in market demand based on the huge popularity of 3-D computer software for effects, architecture, CAD/CAM, and scientific visualization."

Jeong, however, thinks that without high-speed optical computers, the transfer of data required to print out "high-resolution CAD/CAM images on these holoprinters would take too much time."

Before physicians operate in the not-so-distant future, will they examine holograms, suspended in mid-air, of patients' organs? Benton and Jeong point out that a system from Voxel, based in Laguna Hills, California, has been used in clinical tests to create holograms from magnetic-resonance imaging and computed tomography scans. But according to Leith, many physicians say they don't need this costly technology because they can get the information they need from flat pictures.

However, Diamond believes that holographic medical imaging could quickly increase a med student's acuity to that of a seasoned interpretive radiologist. "You wouldn't have to have 20 years' experience in the field to notice subtleties," he says.

Flashes of laser light can read and record computer information throughout the volume of a storage medium instead of solely on the surface. Jeong says that while a photopolymer-based, multigigabyte ROM already has been developed by DuPont, and a terabyte scheme has been tested at Stanford University,

the commercialization of holographic storage "must wait until the rest of the optical computer is developed." Benton argues that this technology "promises incredibly high-storage densities with good error protection and cheap media." Leith is less optimistic. He notes the difficulty of rewriting over only part of the information when it is spread throughout the medium. "Does holographic storage really offer advantages?" Leith asks.

While a current estimate puts the holography industry's revenue at US\$150 million per year, our experts say that new uses of holograms will drastically expand the market over the next few years.

Fischbach, whose company is working with automobile manufacturers on a hologram system to view future car models, says, "If the Big Three include holography in new development, the market will explode." Diamond notes that India and China are "super-aggressively gearing up to bang out millions of linear feet of holograms" for use on birth certificates and voter-registration papers. However, Benton says that it is hard to determine what constitutes the holography industry: "By the time a holographic product becomes successful, it has become part of the 'printing industry' or the 'visualization industry.'"

Have you ever sent a postcard you didn't have to mail?

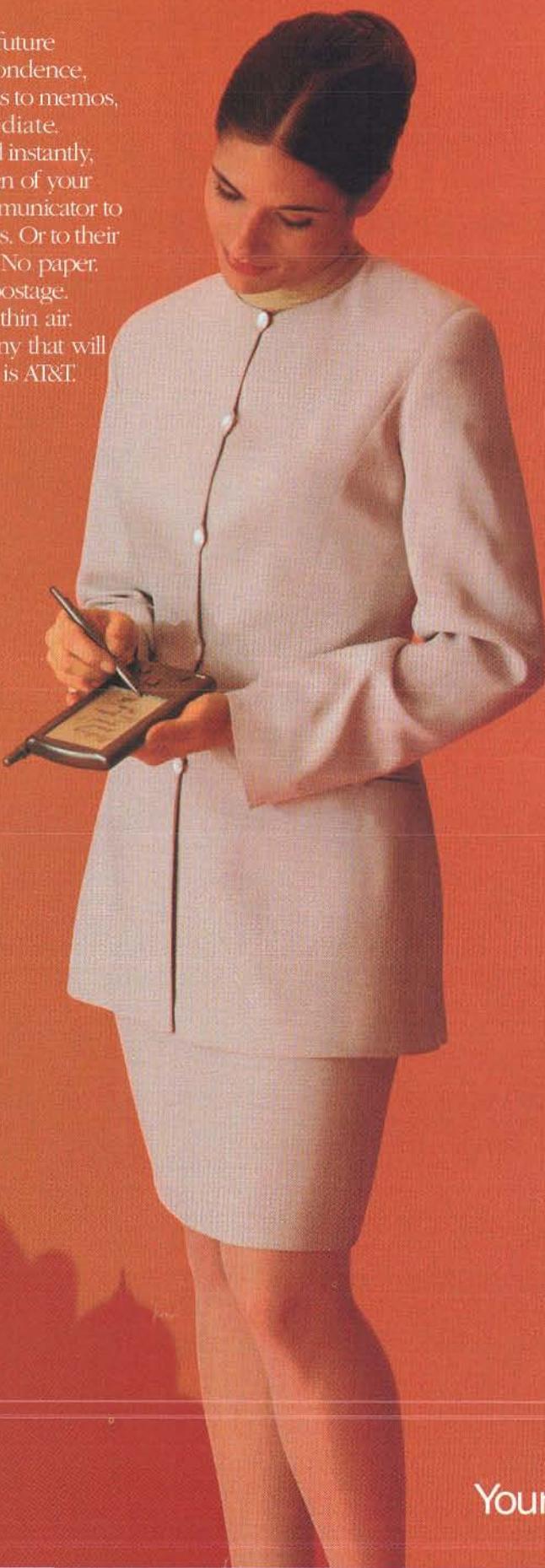
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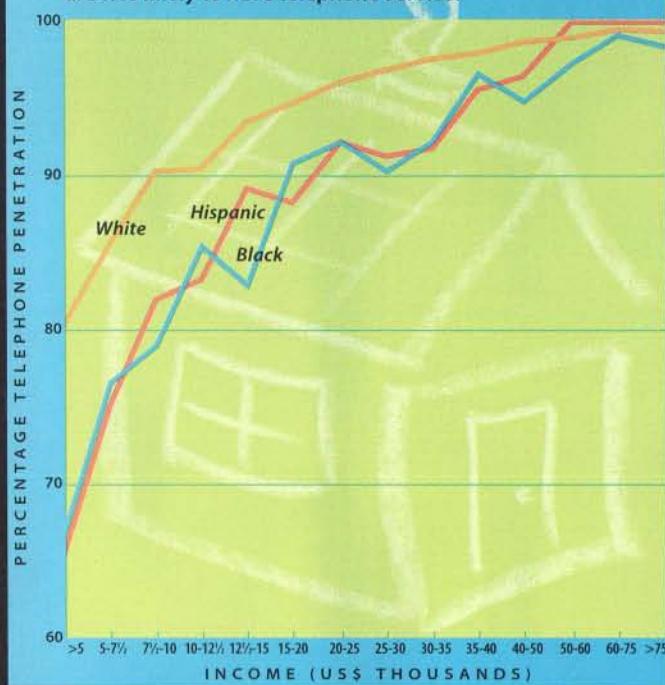


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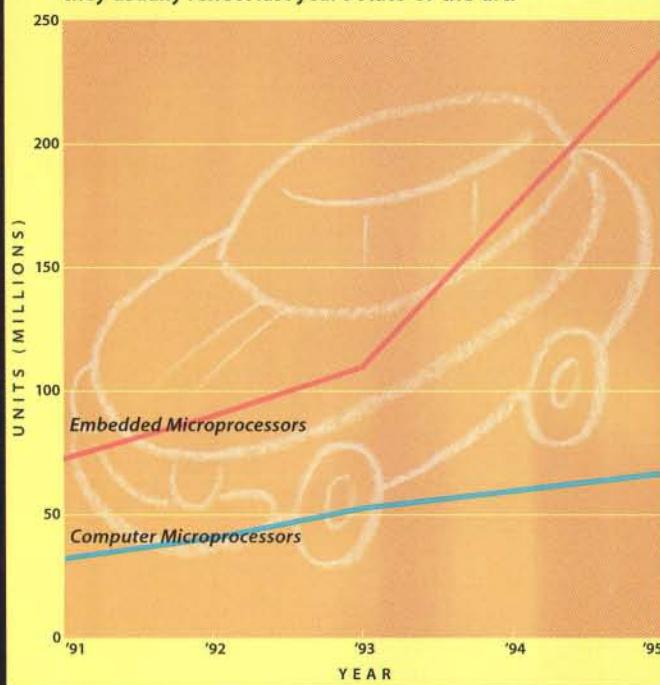
Telephone Households

About 5.6 million households, or 6 percent of all US homes, lack telephone service. Not surprisingly, the higher the household's income, the more likely it is to be connected. Yet even when income is constant, black and Hispanic homes are less likely to have telephone service.



Embedded Processors

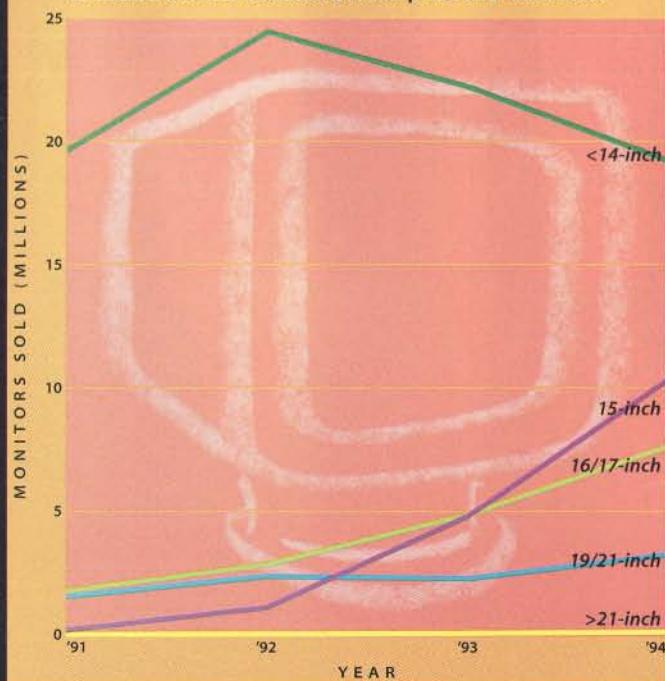
For every microprocessor installed inside a computer, three other 16- or 32-bit microprocessors are sold for embedded uses, such as controlling laser printers or cars. However, embedded processors must be sold at far smaller margins, so they usually reflect last year's state-of-the-art.



Edited by Steve G. Steinberg

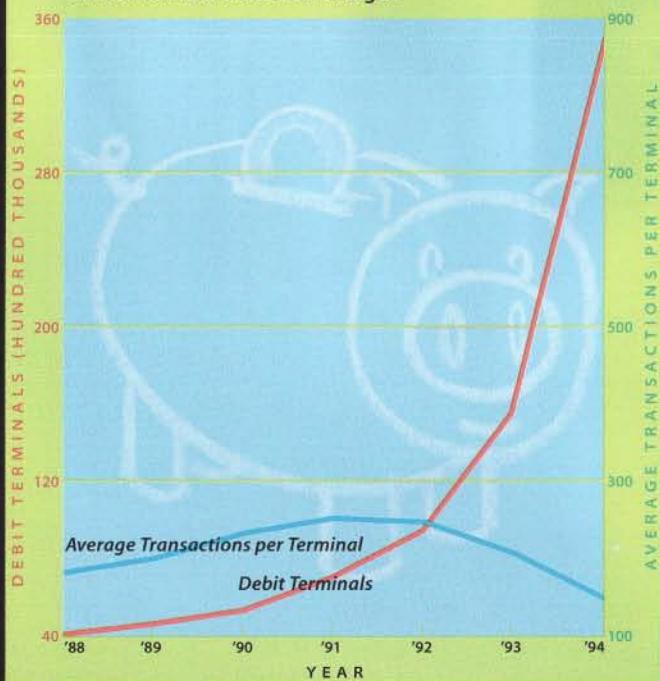
Monitors

Almost 80 percent of the computer monitors sold in 1992 were 14 inches across. But the release of Microsoft Windows, which quickly fills up screen real estate, has led to a rush on bigger monitors. Nevertheless, monitors that are larger than 17 inches are rare because of their price and bulkiness.

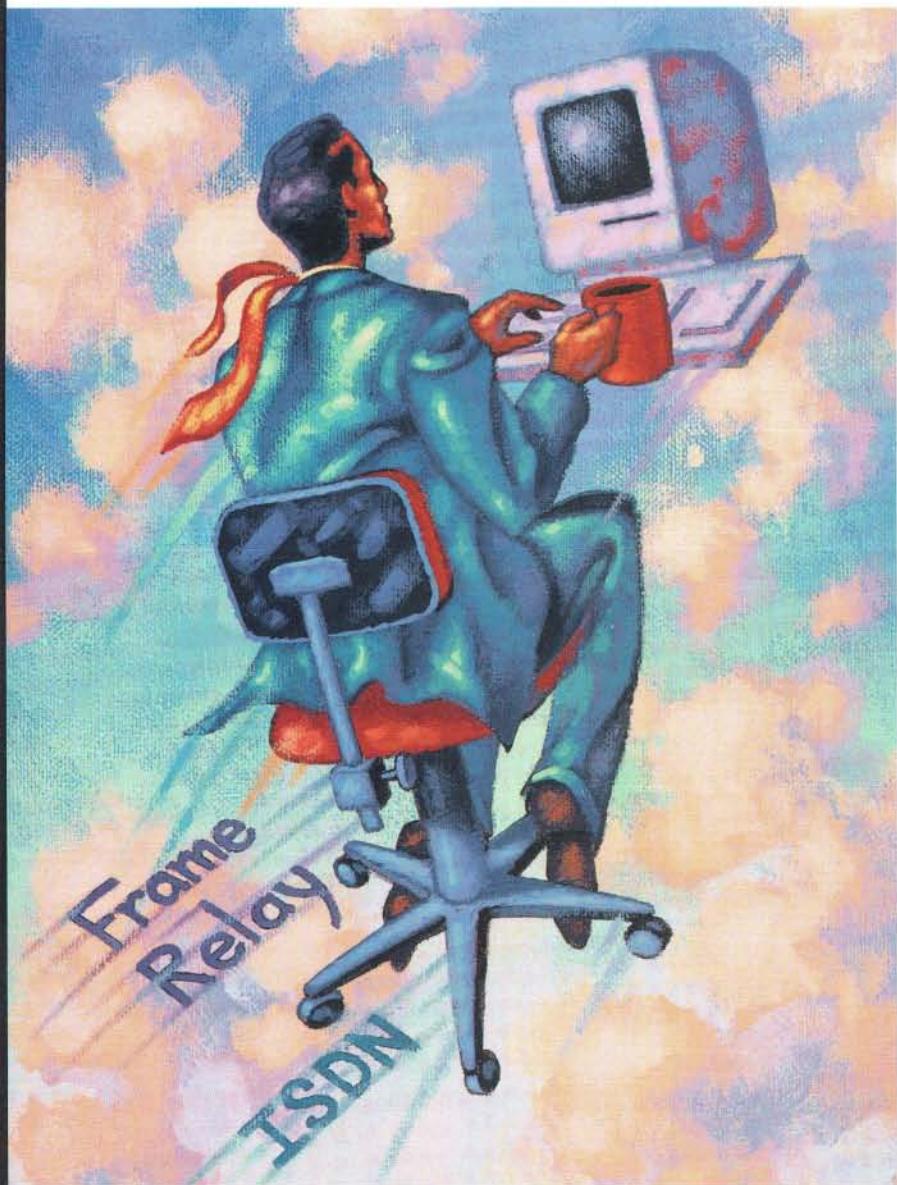


US Debit Terminals

Those who herald the coming of a cashless society cite the phenomenal growth of debit terminals. Last year, the number of terminals that accept ATM-style bank cards doubled as the devices spread to smaller stores. The only cloud on the horizon is transaction charges.



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You Say You Want More Bandwidth?

Solitons and the erbium gain factor.

When network designers talk about *big pipe*, they mean optical fiber – strands of glass drawn as fine as human hair and as transparent as the purest crystal. The fiber

allows huge amounts of data to be sent quickly and reliably between continents and enables new applications such as full-motion videoconferencing and high-speed computer networking. Right now, transoceanic fiber systems have a transmission speed of around 2.5 Gbits per second – to put this into perspective, they can send about one and a half copies of the entire *Oxford English Dictionary* every second. Damn fast, you're saying, but even zippier lightwave systems are in the works. The combination of two technological developments – erbium-doped fiber and solitons – is likely to allow a transmission of more than 100 Gbits per second. At this speed, *Wired* could deliver to you 20 uncompressed electronic copies of this issue – text and graphics – per second.

Since 1975, the transmission capacity of fiber had increased by a factor of 10 every four years. But engineers hit a wall in the mid-1980s: it seemed that optical fiber had been fully optimized, and speeds were stalled at 0.15 Gbits per second. The problem stemmed from the fact that light pulses decline in strength as they travel down an optical pipe. Many nonoptical communications systems resolve this by using repeaters that grab the signal, amplify it, and send it on its way. All kinds of ideas for building

optical repeaters on chips were tried but tossed out – the chips had to convert the light pulses into electricity and then back into light, a process that proved to be a bottleneck.

The breakthrough came in 1987, when Emmanuel Desurvire (now with Alcatel France) and his colleagues at AT&T Bell Labs amplified optical pulses with a piece of fiber impregnated with the rare element erbium. The erbium ions in the glass are optically potent: when pumped up with infrared light, they want desperately to emit their stored power. So, when an optical data pulse comes along, the erbium dumps its energy by amplifying the pulse. And rather than pulling the pulses off at one end, stuffing them into an electronic box marked "amplifier," and squirting them out again, the group at Bell Labs built the amplifier into the fiber. Desurvire was able to do this by building on the work of groups at Southampton University in the UK (which had already discovered the joys of erbium doping) and earlier Bell Labs teams that had built amplifiers with elements other than erbium. Desurvire put the pieces together and in one step created the enabling technology to jack up fiber-optic transmission capacity by a factor of a hundred.

Another promising technique involves the generation and propagation of optical solitons, or *solitary waves* – strange pulse shapes that could theoretically travel down a fiber forever. In another form, these curious

beasts date back to 1834, when an engineer named John Scott Russell was slackening off near the Edinburgh-to-Glasgow canal, watching a barge pull up and stop. He noticed a water pulse leave the prow and begin traveling down the waterway. The sight of this hump of water moving along the surface, wonderfully maintaining its shape, caused Russell to leap on his horse and track the solitary wave. Weird waves come and go all the time in a busy water channel, but Russell followed this one, moving about 9 mph, for a distance of about 2 miles. Being a proper protonerd, Russell rushed home and began playing with water tanks to study his findings.

Russell's solitary waves differ from ocean waves, the walls of water that draw surfers to the beach. As an ocean wave heads to shore, different pieces of the wave begin traveling at different speeds. The top of the wave overtakes the lower part, and the wave breaks, creating a great tunnel ride for the intrepid surfer. Solitons, on the other hand, are waves in perfect balance. Their natural tendency to fall to pieces, either by spreading out or by breaking, is canceled by the nonlinear effect of the shallow water channel.

This same effect was seen with optical pulses by Linn Mollenauer and his co-workers at Bell Labs. Because the optical power in a fiber is so confined, the strong electromagnetic fields interact with the material to produce nonlinear effects. So, just like waves traveling in shallow water, very-short-duration

light pulses of the right shape can propagate as solitons. Thoughts of really high bit-rate, long-haul communications danced in the scientists' minds. While normal waves quickly crumble when they are sent at too high a rate, solitons retain their shape. But because of light's natural tendency to lose intensity when travelling through any medium, solitons also eventually break up and turn into noisy mush. Still no joy.

The turnaround came with the successful mating of erbium amplifiers and solitons. In 1989, Masataka Nakazawa at NTT Labs in Japan successfully generated soliton pulses in his erbium-doped-fiber amplifiers, and the race to speed up and lengthen the transmission capacity was on. The battle for first place has bounced back and forth between NTT and AT&T ever since; currently, NTT leads with its soliton-fiber experiments. Nakazawa has recently shown he can send soliton data down a fiber at 10 Gbits per second. Fancy multiplexing techniques and production-quality equipment should increase that by at least an order of magnitude, perhaps more. What is remarkable is that even after it had traveled 180 million km (or about 4,500 times around the Earth), NTT researchers saw no data degradation. Now that is one long and furious ride. ■ ■ ■

By David Voss

Because solitons are waves in perfect balance, very fast pulses can be used to send binary data without fear of wave dispersion.

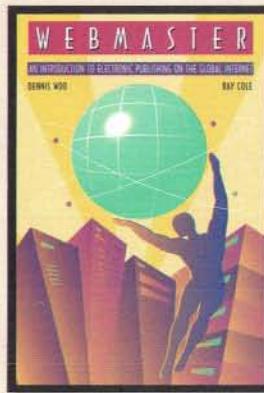
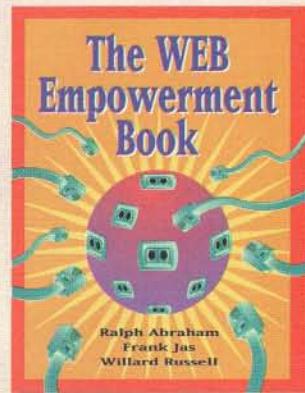
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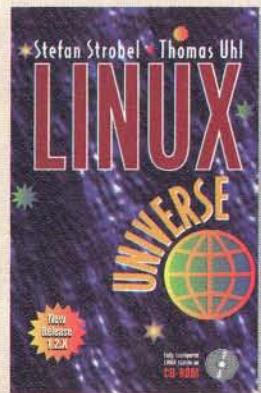
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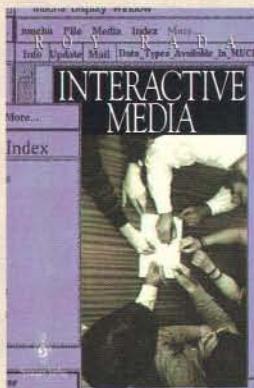
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R. Rada, University of Liverpool, UK

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Capital Exports – Return to Sender

It's not all dollars and cents in my line of work. While dodging attendees of "The Big Picture," *Variety* magazine's entertainment business conference, I plowed right into the

By Anthony B. Perkins barbarian himself, Arnold Schwarzenegger. Not wanting to let a good opportunity go to waste, I asked Arnie for his thoughts on how the major studios distribute films around the world. Said

era of bloated coffers is global investment. England, France, and Germany are littered with a new generation of private interactive content and multimedia tool companies aching for growth capital. Paul Dali, general partner with New York-based Nazem and Company (415/854 3010), recently confided at a venture capital press briefing in Menlo Park, California: "We are now co-managing an international

ture arm of the Ivrea, Italy-based Ing. C. Olivetti & Co. S.p.A.) in throwing money behind ATM Ltd., a two-year-old concern with a second-generation networking software product, based in Cambridge, England. When you dig deeper into the deal however, you learn that ATM Ltd. has just opened headquarters in Northern California. "In every deal we fund, we would like to see the CEO and VP of sales located somewhere on the West Coast so we can regularly visit and help them out," says Douglas Leone, general partner at Sequoia Capital. "It doesn't matter if manufacturing and engineering are overseas."

All in all, most financial insiders agree that this VC trend bodes well for at least the short-term health of the European new-business environment. "Just two years ago, the thought of a European technology start-up raising early-stage venture capital was pure fantasy," says Ovid Santoro, a corporate development manager who raised capital for Argonaut Software Ltd., a privately owned game company outside of London. But with all the US money now available, it isn't as hard for a young startup to find the financial fuel to get off the ground.

Power Mac's alter ego
While US VCs are busy exporting cash, Olivetti is exchanging lire for stock in private Silicon Valley companies. Olivetti Ventures (212/371 5630) is operated by its burly and highly energetic vice chair, Elserino Piol. Piol has been actively investing in private technology companies for more than 30 years. "He keeps four secretaries busy," says Alexandra Giurgiu, who operates Olivetti Ventures's portfolio in the US. Piol's latest brainchild – Power Computing

Corp., the Milpitas, California-based company that recently licensed the Macintosh operating system – is ramping up to graft the IBM clone-maker model onto the Mac market. This company will make money at 20 percent gross by building cheap computers with off-the-shelf parts, a redesigned motherboard, and a simple case – and by selling them by mail order from a warehouse in Austin, Texas. To run the show, Piol signed on Stephen Kahng, the engineer famous for taking \$200,000 and coming up with the design that made Leading Edge a top-selling IBM clone maker in the '80s. Also involved in the deal are Enzo Torresi, who co-founded Businessland and helped get Milpitas-based NetFrame Systems Inc. off the ground, and Carlton Amdahl, a co-founder of NetFrame. All eyes are on Power Computing as it begins to ship in volume.

New trades for TWIT\$

I'm going to hold onto most of the stocks in the TWIT\$ portfolio this month. But I'm so miffed that the price of Applied Digital Access has tumbled, I'm going to cut my losses and run over to pick up stock at Global Village Communication Inc. instead. Global Village, based in Sunnyvale, California, is an established player in the Macintosh modem business – it has recently diversified into the Windows market and has also introduced a hot-selling Internet access software package. Bolstered by a top-flight management team, growth prospects look superior at Global Village. ■ ■ ■

The Wired Interactive Technology Fund (TWIT\$)

Company	Primary Business	Symbol	Shares	Price May 1	Δ Since Apr. 3	Action
Brøderbund Software	CD-ROM sw	BROD	1,100	50 1/4	- 4	hold
The 3DO Company	Games hw/sw	THDO	3,000	13 1/4	+ 1/4	hold short
Silicon Graphics Inc.	Multimedia hw	SGI	2,700	37 1/4	+ 3	hold
Wavefront Technologies Inc.	Multimedia sw	WAVE	5,200	17 1/4	+ 1/4	hold
Mobilis Telecommunications Technologies Corp.	Mobile computing	MTEL	3,300	23 1/4	+ 1	hold
Motorola Inc.	Communications/hw	MOT	1,600	56 1/4	+ 2 1/2	hold
Cisco Systems Inc.	Connectivity	CSCO	2,500	39 1/4	- 1/4	hold
Microsoft Corporation	Sw	MSFT	500	82 1/4	+12 1/4	hold short
Apple Computer Inc.	Hw/sw	AAPL	6,000	38 1/4	+ 2 1/4	hold
Oracle Systems Corporation	Database sw	ORCL	6,000	30 1/4	- 2 1/4	hold
Netcom Online Communications Service Inc.	Internet provider	NETC	30,000	24	+ 1 1/4	hold short
Applied Digital Access	Digital access network	ADAX	4,000	13 1/4	- 1 1/4	sell
ADC Telecommunications	Digital access network	ADCT	4,000	32 1/4	+ 2 1/4	hold
New Stocks						
Global Village Communications Inc.	Communications hw/sw	GVIL	3,800	14 1/4		buy
Portfolio Value	\$1,201,806.25			(+20.18% overall)		- 1.95%

Legend: This fund started with US\$1 million on December 1, 1994. We are trading on a monthly basis, so profits and losses will be reflected monthly, and profits reinvested in the fund or in new stocks.

Information in Follow the Money combines public data, professional insight, and street gossip gleaned from within a crowd of Schwarzenegger fans at *Variety's* Big Picture conference in New York, from the free cocktails line at mFactory's launch party at SF MOMA, from hardware and wiredware booths at the spring COMDEX, and from the Net. *Wired* readers who use this information for investment decisions do so at their own risk.

Schwarzenegger: "If American studios put as much energy into promoting and marketing their films in Europe as they do in the US, they could generate a lot more revenue."

There you have it: cinematic wisdom from the Terminator.

Global investments

There's a new headache for venture capital firms in Silicon Valley: too much money and not enough deals. If money's cheap and deals are scarce, the price for private company stock will become inflated and start to pressure VC returns on investment. One strategy many VC firms are pursuing in this

venture fund with Banexi Corp., a Parisian merchant bank, and this gives us the inside track on funding some of the hot European start-ups. It also provides us with a European beachhead to help our US portfolio companies establish relationships with overseas partners."

Even some of the old-time Silicon Valley VCs are joining the investment scrimmage abroad. Northern California-based venture heavyweights New Enterprise Associates (415/956 1579), Oak Investment Partners (415/854 8825), and Sequoia Capital (415/854 3927) joined 4C Ventures L.P. (a ven-

Anthony B. Perkins (kids@netcom.com) is editor and publisher of *The Red Herring*, a monthly investment magazine published in San Francisco.

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Headed to AST?

Denmark needs a good PR firm. Seriously, what does Denmark bring to mind? Vikings? It's just not '90s. What about Danish? A sticky pastry, right? But with the right PR you might think, Denmark - peaceful, picturesque, and not as pricey as Scandinavia proper! Composed of the Jutland peninsula and more than 400 islands, the country is a hauntingly beautiful world of Renaissance castles and quiet fishing villages, Viking legend and fairy tales.

The capital city of Copenhagen, located on the largest island, Zealand, has an even bigger image problem than Denmark, with no Eiffel Tower or other well-known icon. Nonetheless, this city of medieval churches and modern clubs will impress even the most jaded junketeers.

Wander the winding back streets of the inner city (Indre By) and stroll down the Strøget,

tury Danish furniture design. Modern art lovers should also make the hike to Humlebæk, to visit the **Louisiana Museum**, an impressive collection of modern art housed in a 19th-century villa by the sea.

When your stomach summons, dine a la Danish at the traditional **Cap Horn**. Take a slice of brown bread and pile that *smørrebrød* high with marinated herring, liverwurst, meats, and cheese. For a light lunch or a cool Carlsberg in the inner city, choose **Café Sommersko**, a popular destination during the day and after dark. Or opt for **Café Dan Turrell**, a social spot packed with unstudious students in the evenings.

The Danes delight in jazz, or at least the cosmopolitan Copenhageners do. Stop by the **Montmartre**, the city's major jazz venue, or the **Copenhagen Jazz House**,

AUGUST 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 SEPTEMBER 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

a cobblestoned pedestrian boulevard lined with shops and cafes, stopping at **Chokoland** for a taste of the local licorice. (One lick is enough, however.) When your feet are fatigued, snag a seat in the sun at the **Café Europa**, on Amagertorv, and do a little low-tech surveillance of Copenhagen culture.

Further down the Strøget lies **Tivoli Gardens**, the grande dame of amusement parks, with its old wooden roller coaster and regular firework displays. More amused by art? Amble over to the **The Museum of Decorative Art** (Kunstindustrimuseet) on Bredgade to see their exhibition of 20th-century Danish furniture design.

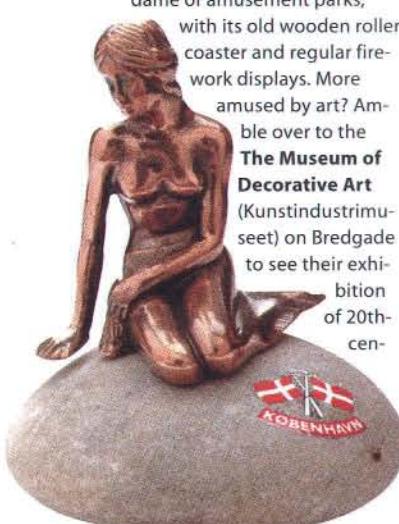
a Cinderella jazz joint, which turns into a disco at midnight.

Though you won't find much rotten in the city of Copenhagen, take the train north to Helsingør to visit **Kronborg Slot**, said to be the site of Hamlet's Elsinore Castle. Shakespeare never visited Kronborg, but that hasn't stunted the local Hamlet souvenir industry.

It's truly a trek, but anyone who's played with those colorful plastic bricks should visit **Legoland Park**, built with more than 38 million Legos, in Billund on the peninsula.

More than enough Denmark data? Just one final fact: early in the Nazi occupation, the Danes smuggled 7,000 Jews across the Baltic Sea to Sweden in one night, saving 93 percent of the Jewish population! Not many countries could pull that off. The truth is, they don't need an Eiffel Tower after all. — Jessie Scanlon

Mange tak to Henriette Mørk, Tonie Olaso-Revon, and all the virtual voices without which I would be literally lost.



WIRED JULY 1995

The Current Roundup (see Wired 3.06)

July 23-25 Spotlight 95; Dana Point, California • **July 25-29** Electronic Imaging and the Visual Arts; London • **July 27-31** The Fourth Quinquennial Science Studies Workshop: Humans, Animals, Machines; Bath, England.

August 4-6 DEFCON III; Las Vegas. • **August 6-11** SIGGRAPH; Los Angeles.

August 16-20 ONE BBS CON; Tampa, Florida The Online Networking Exposition and BBS Convention is the offline event of the online world. For small BBS operators and big-time telecom execs alike, this is the how-to, what-to, when-to, and why-to of networking, from demos of the newest and the fastest products to workshops on building online communities. Registration: US\$250 before August 1, \$325 after. Contact: +1 (303) 693 5253, fax +1 (303) 693 5518.

September 3-7 ICMC'95: Digital Playgrounds; Banff, Canada Hundreds of composers, musicians, and other multimedia artists come out to play at this annual event, sponsored by the International Computer Music Association. The conference includes concerts, multimedia soundscapes, and virtual audio exhibits. Even Chuck Berry would roll over at some of this music. Registration: CAN\$530, students CAN\$260. Contact: +1 (403) 762 6669, fax +1 (403) 762 6665, e-mail icmc95@banffcentre.ab.ca.

September 4 Advanced Surveillance Technologies; Copenhagen, Denmark It's time to get smart. This small, one-day conference, sponsored by the Washington, DC-based Electronic Privacy Information Center, will focus on those unregulated technologies that threaten privacy. Speakers and attendees alike will discuss advanced surveillance satellites, microchip implants, and other technologies that Maxwell Smart only dreamed of. Registration: US\$175 for organizations, \$75 for individuals. Contact: +1 (202) 544 9240, fax +1 (202) 547 5482, e-mail pi@privacy.org.

September 6-8 International Workshop on Information Processing in Cells and Tissues; Liverpool, England Cells 'n' chips are the subject of this gathering of biologists, computer scientists, and other researchers. The workshop concerns the nature of biological information and how information is processed in biological and computational systems. When the cells 'n' chips chat is over, let the fish 'n' chips begin. Registration: unknown at press time. Contact: fax +44 (151) 794 3715, e-mail tissues@csc.liv.ac.uk, on the Web at <http://ribble.csc.liv.ac.uk:80/users/biocomp/iphone.htm>.

September 7-8 InfoWarCon '95; Arlington, Virginia "Sticks and stones may break my bones but words will never hurt me," goes the saying, but these information warfare experts don't agree. The first annual InfoWarCon, sponsored by the National Computer Security Association, highlights personal privacy, industrial and economic espionage, and global information warfare. Winn Schwartau, author of *Information Warfare: Chaos on the Electronic Highway*, will deliver the keynote address. Registration: US\$595. Contact: +1 (717) 258 1816, fax +1 (717) 243 8642, e-mail 74774.1326@compuserve.com.

Out on the Range

September 17-24 ISEA '95; Montreal. Contact: +1 (514) 990 0229, fax +1 (514) 842 7459, e-mail isea95@er.uqam.ca, on the Web at <http://isea95.comm.uqam.ca/isea95.html>.

September 23-October 1 Practice and Future of Autonomous Agents: ASI-AA-95; Ticino, Switzerland. Contact: +41 (1) 257 43 20, fax +41 (1) 363 00 35, e-mail pfeifer@ifi.unizh.ch.

October 12-14 MEDICAL; Charleston, South Carolina. Contact Richard Saul Wurman: +1 (401) 848 2299, fax +1 (401) 848 2599.

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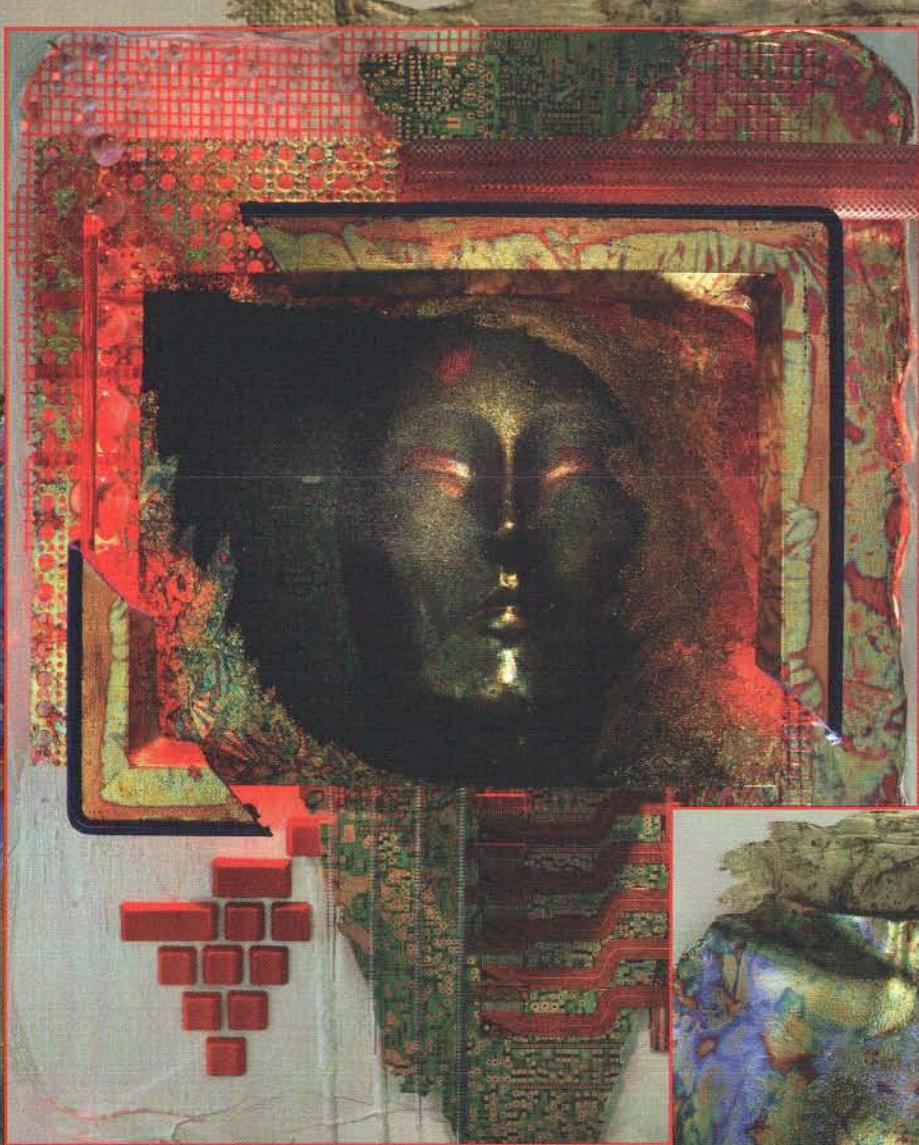
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Apple Spaces Off

The president has left the building; repeat, the president has left the building. Jeff Apple, that is, former co-CEO of daVinci Time & Space. Apple made his exit last March in hot pursuit of two movie deals and a semi-secret, global multimedia project with futurist Alvin Toffler.

With daVinci's second-round strategic financing on track, and team management in place, Apple felt quite comfortable with the move. "Foremost, I wanted to resume my motion-picture career," he explained.

A producer by trade, Apple is certainly motivated to keep daVinci healthy in his absence—he's still a principle stockholder.

"I'm a person of ideas, lots of ideas," Apple recently elaborated. "And I'm focusing my energies on those."

[ORIGINAL STORY IN WIRED 3.01, PAGE 86.]

things at the Consumer Electronics Show very similar to our *Rocket Boy* and *DarkRide*, so we've put those on hold," says Caldwell. "But we still have *Wing Nuts*, a World War I dogfight game, in the works."

Can Rocket Science bounce back after its somewhat dismal débüt? Sure, says industry analyst Sean McGowan of New York-based Gerard Klauer Mattison & Co.

"The fact that they went Sega CD is a perfectly adequate rationale for disappointing sales: any game on a lousy platform is going to do badly, and everyone knows that Sega CD sucks. But I think they've learned some things, and they probably still have a year left to play. No real critical indicators have been passed, and if they have their money partners behind them, they may even have until '96. It's not a business that gives you five years to prove yourself."

According to Peter Barrett, the morale around Rocket Science remains high in the face of adversity. They're bringing in some hot game designers, and the company is collaborating with SGI on what promises to be some reasonably rad 3-D graphics.

"And our money people are still polite to us," sighs Barrett. "That's always a good sign."

—Burr Snider

[ORIGINAL STORY IN WIRED 2.11, PAGE 108.]



Mickey Unbound

The Singaporean government is now online. The Young PAP (the youth wing of the ruling People's Action Party) now patrols every corner of the Internet, posting corrections to "misinformation" about Singaporean politics or culture. The government has also launched its first Web site, the *Singapore InfoMap* – a sort of antiseptic, interactive tourist brochure.

The ruling party has also firmly suggested that Singaporeans watch each other closely, reporting to the authorities anyone producing or engaging in pornographic, criminal, or antisocial behavior.

However, it seems even the minister of information and the arts, Brigadier General George Yeo, understands that the Net is designed to resist censorship. As one cyberpatrolman put it, "The moment you behave self-righteously, no matter how logical your argument, your credibility is lost."

[ORIGINAL STORY IN WIRED 1.4, PAGE 51.]

It Ain't Rocket Science, Stupid, It's Marketing

A year ago, the hottest name in the videogame industry was a precocious little Silicon Valley start-up called Rocket Science Games Inc. With a superstar roster of designers, software architects, Hollywood production wizards; a ton of front money; and a dazzling array of proprietary tools, Rocket Science was touted as a sure-fire winner in the competitive, US\$6 billion, interactive home-entertainment industry even before its first titles hit the shelves for the Christmas season.

So, how did Rocket Science do in its 1994 débüt? "Not as well as we expected," concedes company spokesperson Anna Caldwell.

What went wrong? Well, for one thing, the company backed the wrong horse when it decided to focus on the Sega CD play platform, says Executive Vice President Peter Barrett, the valley Wunderkind around whom Rocket Science was formed.

"We didn't raise all this money and gather all this talent to make action games," explains Barrett. "But we felt our backers wanted to get some titles out on the market fast, and that seemed the best way to go."

However, the money people apparently weren't as rushed as the production team assumed they were. "They would've preferred that we slow down a bit and go for the Big Idea," admits Barrett. "So, now we're going for it."

And what's the Big Idea?

First off the board (although not for a year or so) will be *Obsidian*, a *Myst*-like exploration and idea game that requires more brainpower than shoot-'em-up hand-eye coordination. That will be followed by *Brainspore*, which Barrett promises will be a breakthrough in the horror-story genre.

The trend toward more literate games means that some projects well along the Rocket Science pipeline have had to be scrapped. "We saw some



Death on the Net

Seems censorship isn't as bad as it could be in the great northern wide open (read: Canada). The Associated Press in mid-March reported that CadVision Development Corp., the largest Internet access provider in Calgary, Alberta, was censoring content available to all subscribers. AP got it wrong.

The controversy centered around DeathNet, a site providing info on how to commit suicide. CadVision, Calgary's

biggest online proprietor, received complaints from schools afraid to get online because of offensive sites like DeathNet.

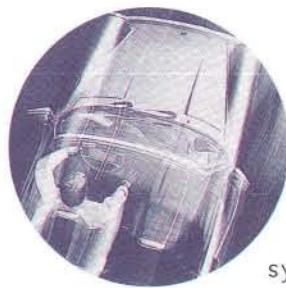
"CadVision will never disable full Internet access to our general usership," assured Geoffrey Shmigelsky, CadVision's president. "However, we must still provide protected access to our scholastic client base." To do so, the company has set up a separate, censored network for those who

want it: a directorship of 12 qualified volunteers and educators evaluates content and votes on which sites to censor.

Another provider, Canada Connect Corp., also offers a specially filtered newsfeed channel for parents wishing to restrict the wanderings of young surfers. Neither company abbreviates full Internet access for those who wish to keep it.

[ORIGINAL STORY IN WIRED 3.03, PAGE 92.]

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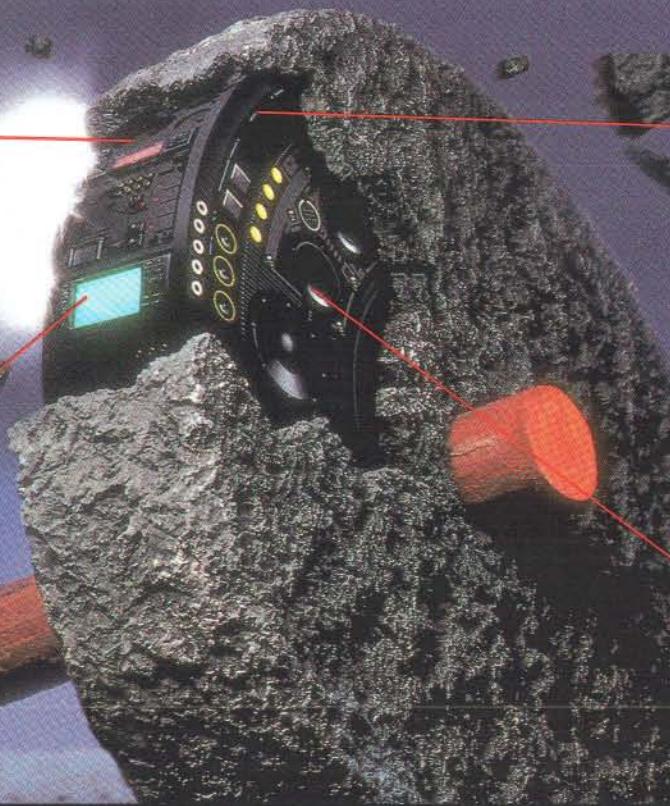


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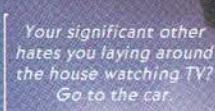
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Big Bang Bust

**Physicist Andrei Linde wants to know:
Since we live in this weird universe – fractal, self-replicating, inflationary –
does that imply that it was created not by God,
but by some physicist-hacker?**

By Rudy Rucker

Andrei Linde, a 47-year-old physicist from Moscow, started teaching at Stanford University in 1990. He lives there with his wife, Renata Kallosh (also a Stanford physics professor, specializing in superstrings and supergravity), and his two sons, Dmitri and Alex. In 1982, he began formulating a new theory of the universe – an

improvement on the big-bang model. He uses computer simulations for much of his research, and he has recently suggested that our universe may be the result of a physicist-hacker's experiment.

An attractive, tidily dressed man, Linde speaks with a thick Russian accent and a colorfully inverted syntax. His responses to the questions of

mathematician Rudy Rucker have been smoothed by Rucker's interpolation and editing.

Wired: By now, most of us have become quite comfortable with the big-bang model of the universe, the notion that the universe was born as a cosmic explosion that gave birth to an ever-expanding ball of space. What's wrong with this idea?

Linde: There are a number of problems with the big-bang theory, but I'll start by mentioning two of a physical nature and two of a philosophical nature.

If you work out the physical equations governing the big bang, they predict that such a universe would be very small, even though we can see that our universe is large. One way to gauge the size of a universe is to talk about how many elementary particles it has in it – how many electrons, protons, neutrons, and so on are present. When I look out of my window, the matter I see is made up of perhaps 10^{88} elementary particles, but a typical theoretical big-bang model envisions a universe with only 10 elementary particles in it! This is perhaps the most serious problem with the big-bang model. It gives a false predic-

tion about the size of the universe. For a number of years, this mathematical flaw in the big-bang theory was not taken seriously by many scientists.

But even if a big-bang universe is of the proper size, the theory doesn't explain why different regions of the universe resemble each other. In a big-bang model, it could just as easily have happened that most of the galactical matter would wind up, say, in only one half of the sky, but we can observe that in our universe, the distribution of distant galaxies is uniform in every direction.

Then come the philosophical questions. What came before the big bang? How did everything appear from nothing? Another philosophical problem with the big bang is, Why does it happen that our universe worked out to be the way it is? Why, for instance, do we have three dimensions of space and one dimension of time? The big-bang theory offers no satisfactory answers. We can begin to resolve the puzzles in the context of the theory of the self-reproducing, inflationary universe.

What is the theory of the inflationary universe?

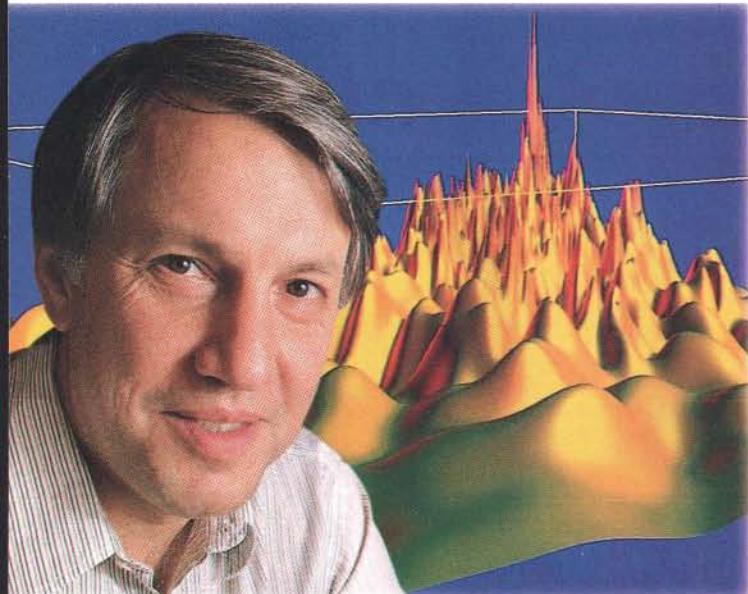
There have been several versions of this theory. The first was proposed by the Soviet physicist Alexei Starobinsky, but it was rather complicated. Then a much simpler theory was put forth by Alan Guth, a physicist at MIT; we call his model *old inflation* now. Guth took the big-bang model and added the idea that in the beginning, the universe expanded rapidly – faster even than the speed of light.

By using the model of the universe rapidly expanding, you solve the problem of why it's so big, and why all the regions of the universe we can see resemble each other. The idea is that the visible part of the universe was inflated from some very small and homogeneous region, and this is why we see large-scale similarities.

However, it turned out that Guth's old inflation had a theoretical flaw that caused the universes of his scenario to become extremely homogeneous after the inflation stopped. I invented a *new inflation* theory which worked so-so until I realized that we could have inflation without the assumption that the universe began in a hot and dense state. Therefore, I dropped the idea of the big bang but kept the idea of inflation. In my model, inflation can start anywhere. This concept is called *chaotic inflation*.

What causes the inflation?

There are things called *scalar fields*. Scalar is a word physicists use simply to mean a *number* – this as opposed to a *vector*, which means something like an arrow. If you have a scalar field, you have a certain number defined at



Andrei Linde in front of a fractal model of the universe. The traditional big-bang theory, Linde argues, is plagued by both physical and philosophical problems.

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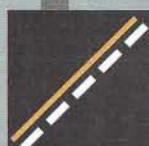
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ELECTROSPHERE

each point of space. Air pressure can be thought of as a scalar field: there is a specific number that measures air pressure at each point. In the same way, temperature is a scalar field: at each point, you can measure the value of the temperature.

Two scalar fields that are important for inflationary theories are sometimes called the *inflaton field* and the *Higgs field*. These fields fill the universe and show their presence by affecting the properties of elementary particles. You don't notice a constant scalar field any more than you notice a constant air pressure or a constant electric charge. When there is a large air pressure, you get wind; when there is a large electrical charge, you get sparks; and when there is a large scalar field called the inflaton field, you get an expansion of space. Quantum mechanics implies that the scalar fields undergo unpredictable fluctuations as a result of the uncertainty principle. If there is a place where the fluctuations make the inflaton field sufficiently large, then at this spot the universe begins expanding very rapidly, which creates so much space that we can safely live there.

What about the "self-reproducing" aspect of your model?

The fluctuations that increase the speed of inflation can happen over and over, again

mountain range. If you chop off the top of a mountain and look at it closely, it resembles the whole mountain range; a single rock on the mountain resembles a whole mountain in itself.

So, we think of the self-reproducing inflationary universe as a fractal. The big bang works as a description of each particular bubble, but it cannot describe the growing fractal. In the fractal model, there is no real reason for the universe to stop growing – indeed, it is likely to keep growing and blooming in new regions forever.

Can you help me visualize this fractal self-reproducing inflationary universe?

There are two kinds of pictures I like to use. In one, I draw something that looks like lots of separate bubbles connected to each other where they touch. It looks a little like the linked flotation bladders on seaweed.

In the other picture – and I've done several computer simulations of this image – I think of space as a flat sheet. Our space is three-dimensional of course, but I represent it in this picture as a two-dimensional rubber sheet. Then I add a randomly fluctuating scalar field, an inflaton field, and I represent the regions where the inflaton field has a low numerical value by valleys, and the regions where the scalar field is large by peaks.

In the fractal model, there is no real reason for the universe to stop growing – indeed, it is likely to keep growing and blooming in new regions forever."

because of the essential fuzziness that the uncertainty principle of quantum mechanics introduces into the equation. This makes the universe self-reproducing; the universe actually replicates itself in all its forms.

The standard big-bang theory depicts a homogeneous universe that looks like a single bubble. But if we take into account quantum effects, the self-reproducing inflationary universe is a bubble producing new bubbles producing new bubbles producing new bubbles and so on. This kind of repeatedly branching pattern is what mathematicians call a fractal. A fractal pattern is characterized by the property that the small bits of the pattern are exact replicas of the whole pattern. An oak tree, for example, is like a fractal in that a single branch of an oak resembles a scaled-down model of the entire tree. Another example of a fractal is a

The peaks are the places where inflation takes place; at these places, the universe will rapidly expand. I can't show the inflation in my picture, but I can represent it by putting new, secondary peaks on top of the first peaks, third-level peaks on top of those peaks, and so on. It is like a mountain range.

What is a little hard to grasp is that the two images represent the same thing. The peaks in one image correspond to the bubbles in the other. A peak that rises on top of a peak is like a bubble that newly swells out from the side of a pre-existing bubble.

Can we travel to the other bubbles of our fractal universe?

In the future, our sky will look much different – as the stars in our neighborhood begin to die. Then we will see into the other parts of the universe, parts with different laws of physics. Can we use the energy in our cooled-

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off bubble? Can we fly to the other tips of the fractal? Can we go there and live comfortably? The theory of cosmic flights over vast distances suggests that even if you were to travel at the speed of light, you lose so much time that when you get to another part of the universe, it will be cold and empty there.

You say that some of the different bubble universes have different laws of physics – how does that work?

We've talked about the inflaton field responsible for the universe's expansion. As I mentioned before, it seems that there may also be a second scalar field that creates different kinds of physics in different regions of the universe. This is the Higgs field. There is one overall law of physics for the whole universe, but the Higgs field makes for different realizations of this law. The principle is similar to that of water existing in different phases.

What if I could somehow fly up to the edge of a region of the universe with different physics? How would it look?

Between the different regions of the universe, there are boundaries called *domain walls*. There is a tendency of the domain walls to smooth out. You might think of them as being a little like the boundaries of soap bubbles in a foam, with the regions of different physics the insides of those bubbles. The domain

But we don't need to worry too much; the distance from us to this next domain wall is typically estimated to be much greater than 10 billion light years, so we may live for now. **Might we say that the regions with different physics compete with each other?**

The regions of the universe that grow faster contain more volume, so perhaps they contain more inhabitants. This looks like Darwinian fitness. Should we discriminate and say those with greater volume are winners? There is a lot of place for losers as well; everything that can exist tends to have room for its existence in the self-reproducing inflationary universe. We can think of a Darwinian process without hate and killing.

How did the whole process begin?

Maybe the universe didn't have a beginning. There are some philosophical problems with the idea of the universe having a beginning. When the universe was just created, where were the laws of physics written? Where were the laws of physics written if there was no space and no time to write them? Maybe the universe was created without obeying any laws, but then I don't understand. Well, maybe the laws and the universe came into existence simultaneously. Quantum mechanics might say that our universe together with its physical laws appeared as a quantum fluc-

The regions of the universe that grow faster contain more volume, so perhaps they contain more inhabitants. This is a bit like Darwinian fitness, without hate or killing.

walls might be irregular to start with, but over time they straighten out. In addition, the regions will tend to shrink or expand, and this expansion is in fact very rapid – it is at a speed approaching the speed of light. This means that the domain walls will be moving in one direction or another with a speed approaching that of light.

So, first of all, it would be difficult for you to reach a domain wall if it is moving away from you at any speed. And if it is moving toward you, it would be difficult to run from it because it will be moving very fast. In fact, if a wall moves toward you at the speed of light, then you first see it only at the moment it hits you. And then you would almost definitely die, since the physics on the other side of the wall would be different and unlikely to support your form of life. You will be exactly like a fish out of water.

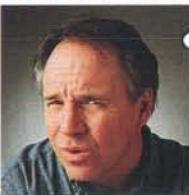
tuation, but how were the laws of quantum mechanics written before creation?

In one of your papers, you talk about relating the nature of our consciousness to our universe. What do you mean?

For me, the investigation of the universe is mainly a tool for understanding ourselves. The universe is our cosmic home. You may imagine you can learn something about your friend by looking at how his house is built. My final purpose is not to understand the universe, but to understand life.

An example of this is the question of why we humans see time as passing. According to the branch of physics called *quantum cosmology*, the universe is best represented as a pattern called a *wave function* that does not depend on time. But then why do I see the universe evolving in time? The answer may be that as long as I am observing the uni-

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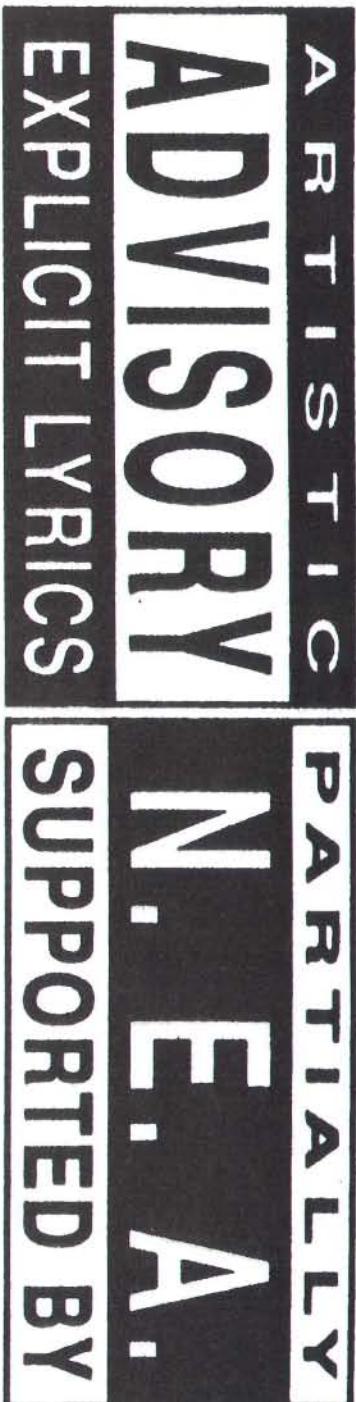


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ELECTROSPHERE

verse, the universe breaks into two pieces: me and the rest of the universe. And it turns out that the wave function for each of these separate pieces does depend on time. But if I merge with the universe, my time stops.

You've suggested that it might be possible to create a universe in the laboratory by violently compressing matter, that 1 milligram of matter may initiate a self-reproducing universe. How would this work?

It would be hard. You have to do more than just compress the matter. But with high temperatures and quantum effects, there is a chance of creating a universe. Our estimates indicate that you would need a very good laboratory indeed. And it is not dangerous to try. This new universe would not hurt our universe; it would only expand within itself – like bulging a bubble out from the side of our space.

Can you imagine there being any kind of economic or spiritual gain from creating new universes? Might this lead to a Silicon Valley industry or to a cosmological cult?

The question is, Is it interesting to create a universe? Would you have a profit or benefit? What would be the use? Suppose life in our universe is dying, and we make a small private universe we can jump into so we have a place to live. But it's not easy to jump

inflationary universe. But then the letters expand so much that for billions of years to come, each race of people in the universe will be living in the corner of just one letter. They will never see the message. The only way I have found to send information is strange and unusual. If I create an inflationary universe with a small density, I can prepare the universe in a particular state that corresponds to different laws of physics, masses of particles, interactions, etc. I can imagine a binary code describing all possible laws of physics; this would be quite a long sequence. So, if I am preparing a universe in some peculiar state, I can send the message encoded in the laws of physics.

Can I send a long message in this way? Let's think about our own universe. Let's imagine that someone made our universe as a message. If our universe is perfect, with all particles having equal masses and charges, then the laws of physics would really be trivial, and it would be a very short message. But our particle physics looks weird, and it has a lot of information. We get these strange numbers; there is no harmony when we try to make sense of it all. There is information instead of harmony. Perhaps it would be more precise to say the harmony is there, but it is very well hidden.

For me, the investigation of the universe is mainly a tool for understanding ourselves. My final purpose is not to understand the universe, but to understand life.

between universes. When we create a universe, it is connected to our universe by a very narrow bridge of space – we can't jump through it, and the new universe will repel us because it is expanding.

Well, maybe you can get energy from the new universe? No, you can't get energy because of the law of energy conservation. The new universe gets its energy internally, and the energy has to stay inside there. We can't get in, we can't use the energy, but maybe we can do like we do with our children: we teach them and we live on in them. Maybe we can give knowledge and information to the new little universe.

Would you be able to communicate? To send information to and from that universe you helped create?

It is not so easy to send information inside. Say I wrote a message on the surface of an

To send a long message, you must make a weird universe with complicated laws of physics. It is the only way to send information. The only people who can read this message are physicists. Since we see around us a rather weird universe, does it imply that our universe was created not by God, but by a physicist-hacker?

I don't entirely think of this possibility as a joke. Even if something seems counterintuitive, you must be honest and follow the thought line and not be influenced by the common point of view. If you agree with everything everybody else thinks, you never move. ■■■

Rudy Rucker (rucker@jupiter.sjsu.edu) has written a novel *The Hacker and the Ants* about near-future Silicon Valley. To e-mail Andrei Linde: linde@physics.stanford.edu.

You are not making art.

It's not going to hang on

someone's wall. It's going to go into someone's magazine. Or wrap someone's fish.

Or be thrown in someone's trash. You know all this. And yet. You work too many hours. You fight with the client. You fight with your partner. You fight with yourself. You spend weeks selecting the right talent. You spend days tweaking the details. You check the proof. You reject the proof. You check the proof again. You run out of time.

You see it in a magazine. You are disappointed. Again. You scream and holler.

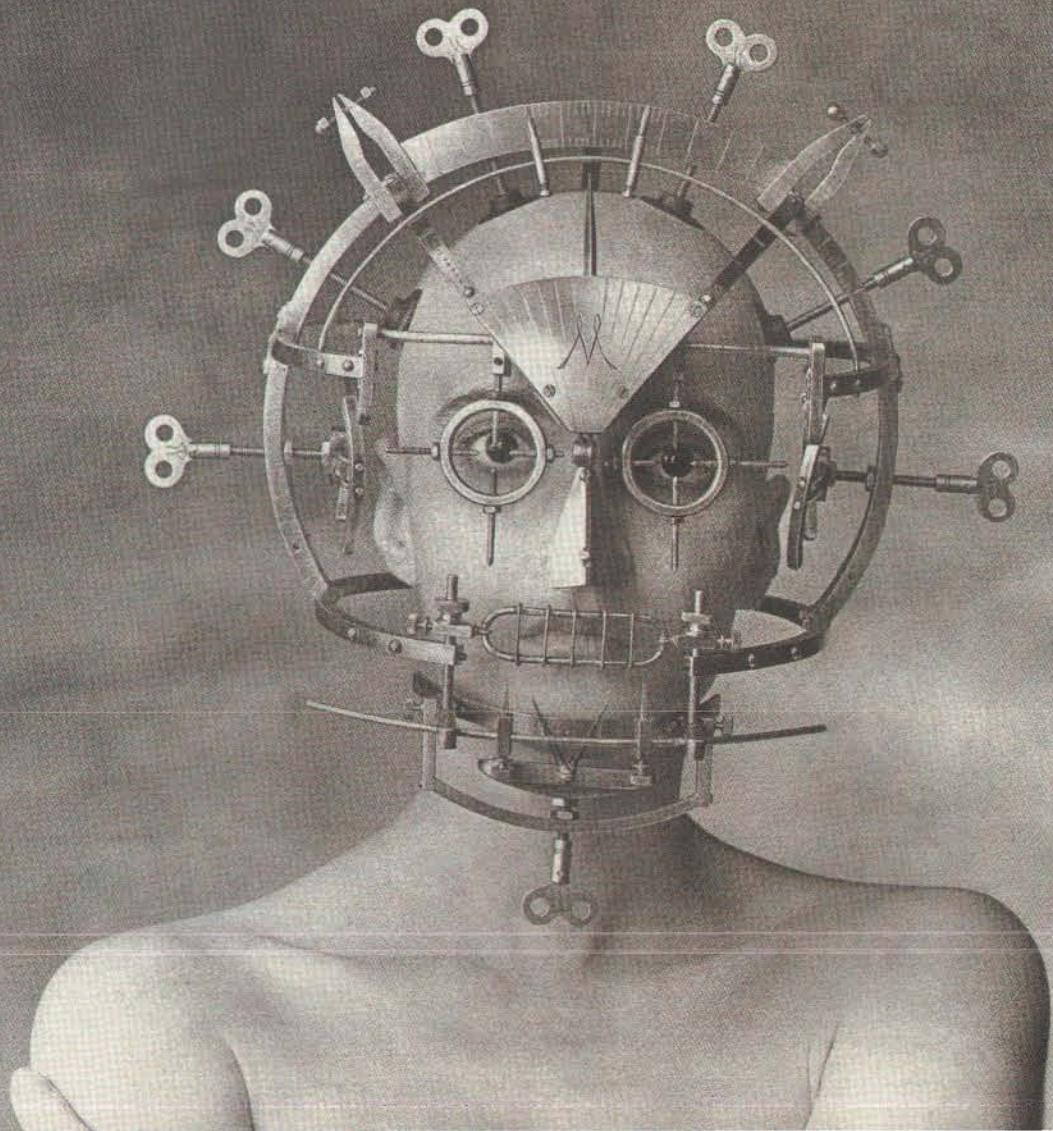
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Microserfs: Transhumanity

"Microserfs" started out as an acclaimed short story in *Wired* about the life of young coders at Microsoft.

The full story including this excerpt is now a novel, just released by HarperCollins. Stay tuned for the upcoming Fox TV show.

By Douglas Coupland

The cover story for the January 1994 issue of *Wired* spun the tale of seven Microsoft employees – Todd, Bug, Abe, Michael, Karla, Susan, and the narrator, Daniel – searching for purpose while grinding code for the all-knowing Bill. That story has become the first chapter of Coupland's recently released book, *Microserfs* (HarperCollins). In this excerpt, the original crew has grown in number and found

the courage to leave the mother ship, move to Silicon Valley, and pursue the ultimate goal: starting up a company and building a product of their own creation. In 18 months of coding madness, they created *Oop!*, a cross between Legos and an erector set, with the smarts of AutoCAD built in.

Michael, who in the first installment

readers enter the money-starved, deadline-wracked, product-choked, nerd-dense, reward-based realm of American computing circa 1995. In this excerpt, the Serfs visit the Las Vegas Consumer Electronics Show, where *Oop!* will either be made or destroyed.



Thursday, January 5, 1995

The Alaska Airlines captain said, "Ladies and gentlemen, the city of Las Vegas is below us to your right. You will be able to see the pyramid of the Luxor Hotel."

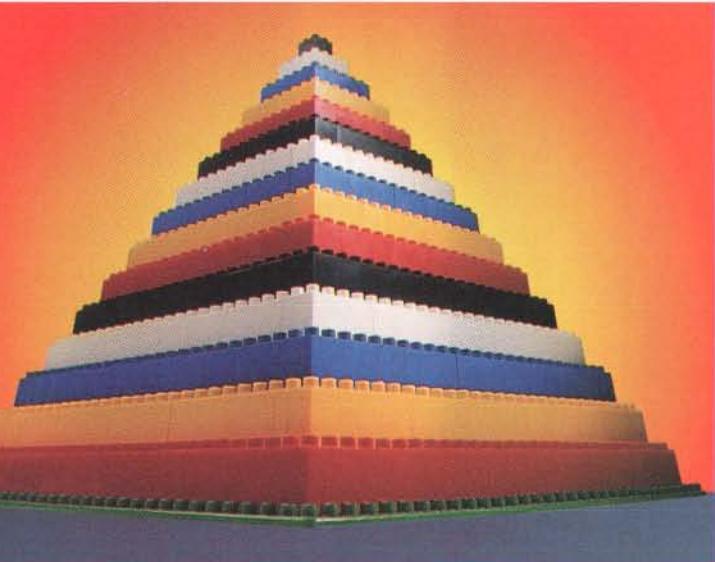
The 737 lurched sideways as its human cargo chugged like Muppets to view a Sim City game gone horribly wrong: the Luxor Hotel's obsidian black glassy pyramid, and beside it, the Excalibur's antiseptic, Lego-pure obscenely off-scale Arthurian fantasy. Farther up the Strip was the MGM's jade glass box representing with 3,505 slot machines and 65 gaming tables the largest single concentration of cash points on earth – "the Detroit of the postindustrial economy," Michael declared.

It was pleasing for me to see so many of the faces of the people in my life, lit by the glow of the cabin windows – Karla, Dad, Susan, Emmett, Michael, Amy, Todd, Abe, Bug, and Bug's friend, Sig – their faces almost fatally blank and uncomprehending at the newness of the world below into which we would shortly dip.

Sig is an ophthalmologist from Millbrae who convinced Bug that he wasn't stereoscopically blind. He's a vast improvement over Jeremy, and Bug is suddenly so much more himself, relaxed and joking and just... glad. He almost got whiplash from craning his neck halfway through the flight trying to catch a glimpse of the ultra-secret Groom Lake military facility. He told me, "They have UFOs and aliens cryogenically frozen there."

I said, "Right, Bug. As if Alaska Airlines is allowed to fly over a top-secret base." And Bug replied, "Look down there, Dan – that's the place they staged the fake moon landing back in 1969." I looked, and it did resemble the moon.

Susan, Karla, and Amy have really Chyxed out for CES – bulletproof vests over tiny little tube tops (Susan has declared that it's her responsibility as a feminist media figure to singlehandedly revive the tube top), baggy jeans worn low on the hips, and black sunglasses. Susan continues to gain celebrity with Chyx (*The New York Times*

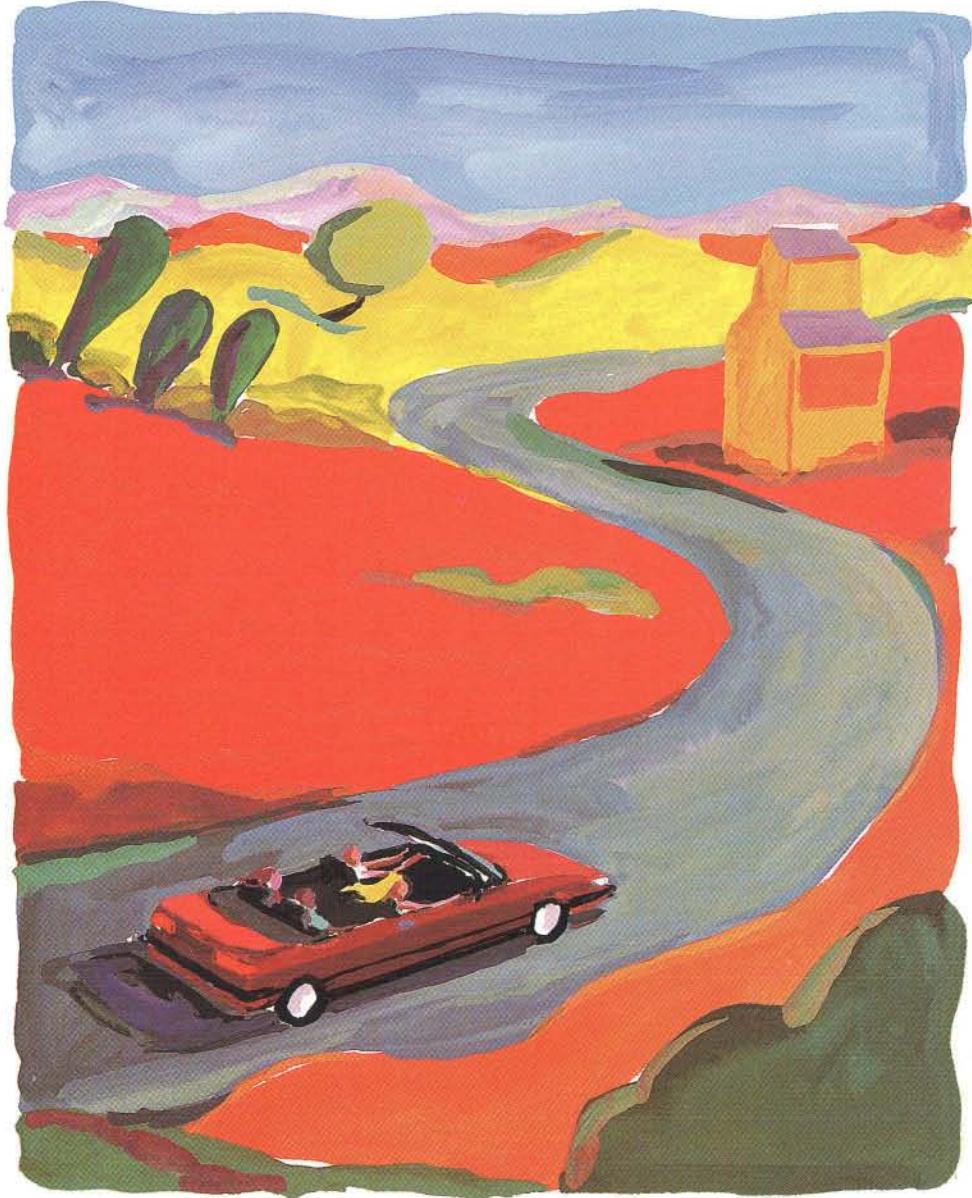


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had left Seattle on a secret mission for Bill in Cupertino, became the catalyst for the company. Once he tasted Silicon Valley and realized its potential, he never came back. Michael asked the original Microserfs to come down and help him form *Interiority Co.*; they were joined by a number of new recruits, among them Ethan, a perpetually dandruff-laden venture capitalist (who later contracted skin cancer), and Dusty, a female bodybuilder and accomplished coder (whom Todd found at Gold's Gym and later got pregnant).

The crew set up shop in Daniel's home in Palo Alto, and Daniel's father, who in the last excerpt was drunk and despondent after losing his job at IBM, is now merrily working for *Interiority* doing "alliance building." Bug has come out of the closet, Susan has found her calling as the leader of a Net-based women's movement called Chyx, and Karla and Daniel have fallen in love. Karla, it turns out, is an expert at shiatsu massage.

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The look on all the registrees' faces was great.

You could tell that all they could think of was sex and blowing their money later that night.

It was so transparent – Las Vegas brings out the devil in everyone.

business section last week). All three of them decided to dress "Tough Love" because Ethan told them the fair is 99 percent male and they don't want to look "like dweeb bait."

Also on the plane was a company called BuildX which is doing an Oop!-like product, down in Mountain View. There were eight of them, and they wore matching black sweat shirts with futuristic BuildX logos on them, and they looked like the Osmonds or the Solid Gold Dancers. We didn't talk to them the whole flight.

Ethan couldn't come. He's back in Palo Alto, staying with Mom while he does his chemotherapy, which appears to be going well, even though it makes him crabby. He's starting to lose a little hair, not too bad, and this is a terrible observation, but his dandruff

is finally clearing.

Dusty is still in disbelief that her baby wasn't a grapefruit, and is also at Mom's house for a few days while we're at CES, nursing Lindsay Ruth and keeping Ethan company. Mom is giving her a crash course in motherhood, dragging out embarrassing baby photos of me and tiny little jumpers that I had no idea she kept. Dusty sits and stares at Lindsay for hours on end, saying to anyone who'll listen, "Ten toes! Ten fingers!" Lindsay was delivered on the evening of the final round of the Iron Rose IV competition, and Todd told me on the flight down that Lindsay Ruth was named after movie-of-the-week star and bionic woman Lindsay Wagner, as well as a Bible person. He hasn't really talked about the baby yet – I think it's finally sinking in that he's a father, now that he's got the physical proof.

Luggage lost; luggage retrieved; Vietnam-veteran taxi driver; Gallagher billboards. We checked into our hotel in a daze – a creakingly old hotel called the "Hacienda." (Best not discussed. Its sole redeeming feature is its location right next door to ... the extravagant beyond-all-belief pyramid of the Luxor.)

We left the hotel to register at the Convention Center, many football fields' worth of sterile white cubes, which are as attractive as the heating ducts atop a medical-dental center. The look on all the registrees' faces was great. You could tell that all they could think of was sex and blowing their money later that night. It was so transparent – Las Vegas brings out the devil in everyone.

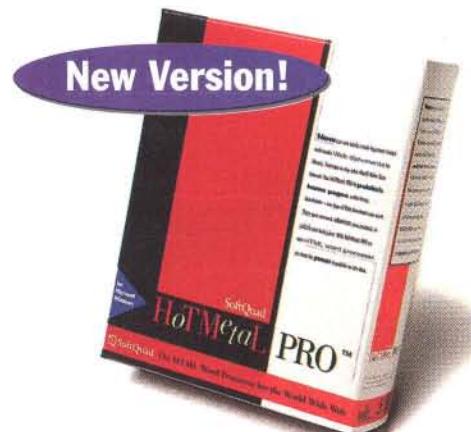
Las Vegas: it's like the subconsciousness of

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**Our ancient queen-size bed was as concave as a satellite dish –
the same mattress must have been mangling the lumbars
of low-budget gamblers since the Ford administration.**

the culture exploded and made municipal. When we returned to the hotel to change, Karla's and my room somehow became the party room. None of us except for Anatole, who's here to schmooze Compaq, has ever been to Las Vegas before, let alone CES. (Amy called us "bad American citizens.") We were all giddy at the prospect of an evening's unchained fun, sleazy adventure divorced from consequences.

Anatole and Todd brought up vodka, mixer, and ice. Our ancient queen-size bed was as concave as a satellite dish – the same mattress must have been mangling the lumbars of low-budget gamblers since the Ford administration – so we sat clustered in its recess like kangaroo babies inside Mom's pouch. Chugging V&Ts, we surfed through the channels, high on simply being in Las Vegas, even just watching TV in a

hotel room in Las Vegas.

The TV began showing these three-minute pay-TV movie clips. ("Hey, let's watch *Curly Sue!*") Then one came on touting the AVN Awards, the Adult Video News awards. Susan yelled, "The Stiffies!" It's an actual Academy Awards-style show for porn people. We had to pay. It was simply too juicy *not to*. People were sashaying up the aisles to collect awards for things like "Best Anal Scene," and they were getting all teary and emotional making acceptance speeches. It was unbelievable.

We phoned Mom, and she said Ethan was woozy from today's treatment. Lindsay is pleasingly, Gerberishly plump, and former bodybuilding enthusiast Dusty is eating my family out of house and home. Mom asked, half-jokingly, but also for real, if Dad, our ex-

IBMer, was pulling his weight as our company rep, but I said we wouldn't be able to tell until tomorrow.

The 10 of us double-cabbed (20-minute cab wait) up the Strip (clogged) to a Sony party Todd had gotten us semi-invited to and dropped Dad off at the MGM Grand along the way. All three Chyx in the two cars shouted in practiced tra-la-la voices, "Good night, Blake Underwood, you hulking piece of man meat!" Dad's ears turned bright red. I think the porno awards were a bad influence on them.

At the Sony party, we all got weirded out because the Stiffie Award winners and their film clips were still in our brains – suddenly all of the people at the party looked like they were porn stars, even though they were just real people. And then we realized that viewed



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The geeks aren't flying down to Los Angeles

to take studio executives out to schmooze dinners at Spago.

Spago has to come to the geeks. Spago must hate that.

from a certain perspective, *all* people can look like porn stars. So, for a few minutes there, humanity seemed really scary indeed. I wonder how porn people's mind-body relationships are - I can't imagine. Their bodies must be like machines to them, or products to ship, but then they're not the only ones - Olympic athletes and geeks and bodybuilders and people with eating disorders.

But the Sony party ... we checked out the live-action footage in the new Sony games, and the acting - it was so *cheesy*. It was like porn acting. This merely reinforced our collective impression that the real world is a porn movie. Talking to a Sony executive named Lisa, I asked her how they went about recruiting talent for games, without actually saying that their live action sucked. She told me that industry people aren't realizing yet just how unbelievably expensive it is to shoot

any sort of game with live action. "Just say the words 'live action,' and the price goes up a million dollars," she said.

I then wondered out loud if starring in multimedia is going to be the modern equivalent of appearing on *Hollywood Squares*.



We were talking with another woman, also named Lisa (which wasn't hard to remember because every single woman we met there was named Lisa). "Last year, all of the studio executives were bluffing it about multimedia," she said, "but this year, they're starting to panic - they don't have a handle on what they're doing, and it's starting to show, and mistakes are costing them a pile of money - trying to spooge *Myst* into a feature-length movie; trying to spooge movies into CD-ROMs. It's a mess. And New York still doesn't

have a clue. Usually they're first, but with multimedia, they're babies, and it annoys the hell out of them. The people who really do know what's going on are the people who *aren't* posing as visionaries."

I thought about it and she's right - the geeks aren't flying down to LA to take studio executives out to schmooze dinners at Spago. Spago has to come to the geeks. Spago must hate that.

Susan was chatting with a male Lisa-unit solely to torment Emmett, but he's used to it by now. Susan was a real cachet addition to our party. She's become such a cult figure with Chyx. It was like Jim Morrison had entered the room, and she was swamped with admirers.

Karla and I and a few Lisas tried to guess what the charades hand signal would be for an interactive multimedia product. A movie



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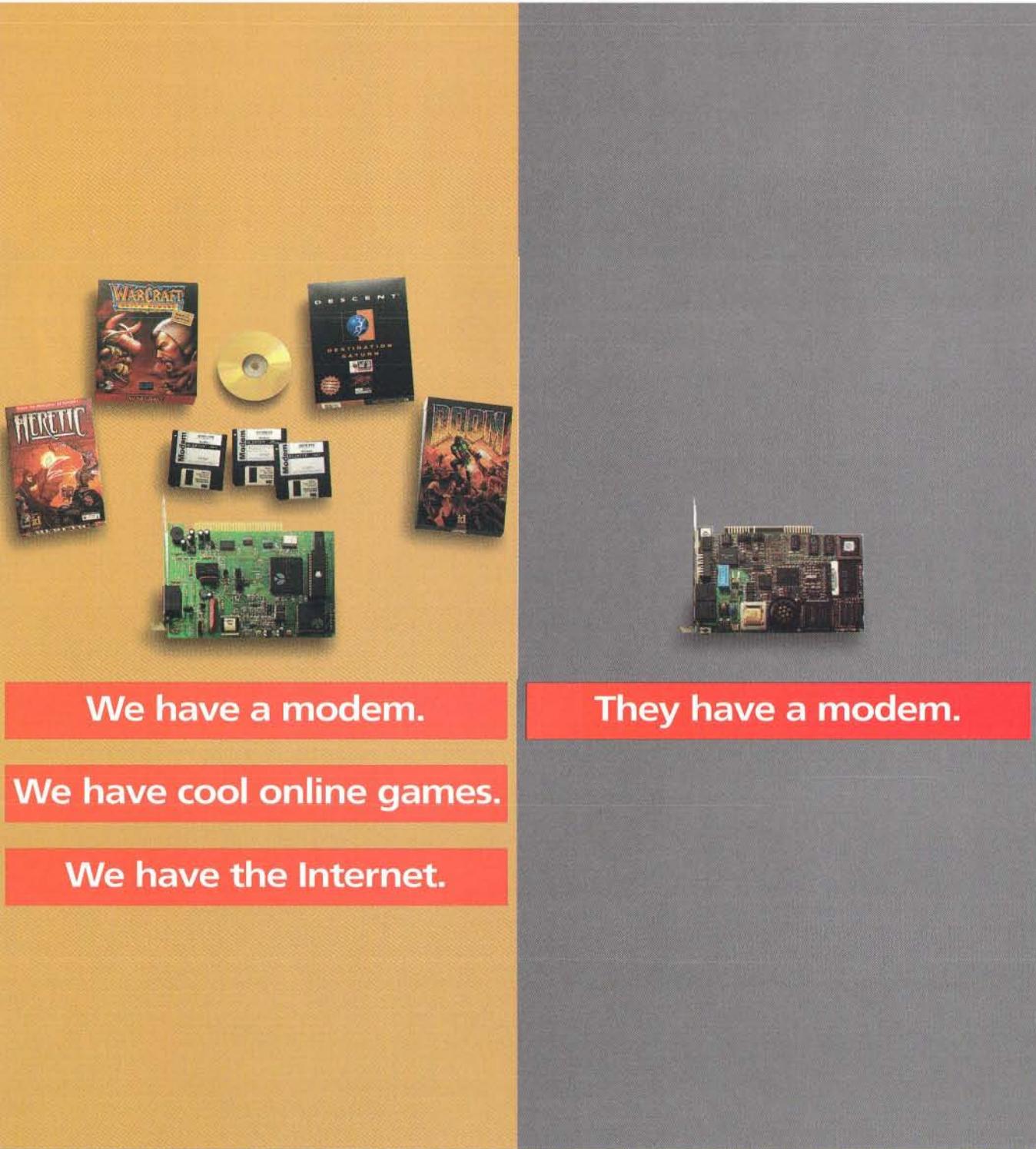
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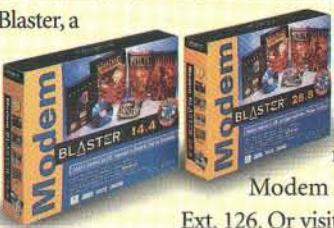
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is where you turn a camera reel; a song is where you hold your hands up to your lips; a book is two palms simulating open flaps. All we could come up with for multimedia was two hands going fidgety-fidgety in space. A definitive interface is certainly needed, if only to make charades an easier game to play five years from now.

After we left the Sony party, we wandered around the grounds of the yuppie hotel, and I never realized it, but Todd's a mean drunk. Maybe his new haircut is bringing out "the asshole within." He went around the pathways kicking muffins into hot tubs and sticking pilfered beta versions of Sony CD-ROMs down the hotel's miniature fake rivers, and screamed at all of us, calling us geeks. *Hooo... like, this is some big surprise, or something?* I suspect that becoming a father and spending the last two months (as did we all, Dusty included, barely able to reach her keyboard over her watermelon stomach) tweaking code for the Oop! beta version for Las Vegas has all got to him, and he's releasing the pressure. We all feel it. Tomorrow and Sunday we find out if Oop! and Interiorty Co. have a strong future.

At the mall in Caesar's Palace, we bumped into the BuildX team at the Warner Bros.

There's something timeless about the false sincerity and synthetic goodwill of meetings, the calculated jocularity, the simian dominant-male/subordinate-male body language.

store. We bought our Marvin the Martian coffee mugs and house slippers, glared at the BuildX team, and left.

I wonder if Bill ever runs into Larry Ellison or Steve Jobs at a 7-Eleven.

We all wanted to go to the Luxor and play the games and do the rides there, inside the pyramid's interior. Emmett informed us that Sega has its only showcase arcade there, where you can play the brand-new-almost-beta games. It's a brilliant marketing idea because normally, arcade games don't enjoy the same kind of brand recognition and loyalty that home games do, but after visiting the Sega arcade, the logo is burned into your brain permanently. It's like allowing a McDonald's orange drink machine at your child's birthday party.

The Luxor has a laser beam of pure white light that shoots up from the tip of its pyramid; I'd never seen anything so tall, and never knew this beam of light existed. Pure and clean and seen from the ground, it's so powerful that it really appears to puncture the atmosphere. I started rambling on about the laser, but everyone thought I'd gone loony, and Abe told me to be quiet.

Friday

Todd made out last night with a Lisa-unit from the Sony party. This morning he burst into Karla's and my room and confessed, teary-eyed and carrying a basket of croissants. It was a bad start to a weird day. He was sick with remorse.

Anatole was in the bathroom borrowing Karla's blow-dryer, so he heard everything through the door. Todd made me, Anatole, and Karla swear on a stack of Bibles that we would never say anything to Dusty. Anatole launched into one of his "Een my couwn-tree..." tirades about how French men all have mistresses, but he stopped when he saw how sad Todd looked.

Todd was morose and silent all day. I thought about Dusty and Lindsay Ruth at

home and was glad he felt miserable, but he'd been in such denial over his new family unit that he was bound to explode. At least he didn't sleep with a Lisa.

Also, it was raining outside. *Raining.* It was so odd to think of Las Vegas having weather, like it was a real place. But since everyone's always indoors in the casinos, I guess it doesn't really matter.

CES is a trade show like all other trade shows: thousands and thousands of men, for the most part, wearing wool suits with badges saying things like: Doug Duncan, Product Developer, MATTEL... or NASA, SIEMENS NIXDORF, OGILVY & MATHER, and UCLA, and so on. Everyone loads up on free promo merchandise like software sam-

plers, buttons, mugs, pins, and water bottles as they dash from meeting to meeting. The booths are all staffed by thousands of those guys in high school who were good-looking but who got C pluses; they're stereo salesmen now and have to suck up to the nerds they tormented in high school.

We Oopsters were in and out of meetings all day, mostly earnest affairs held in little rooms above the convention floor. They look the same in every hotel: chrome and glass rental furniture, extension telephones, and a water cooler. All these people meeting inside, wearing the first good suit in their lives, turning old right before your eyes.

We were really just there to schmooze and do PR, since our distribution's taken care of, and to approach people to develop Oop! starter modules. Standard stuff. We also did "seed plants" ... *who* you give your software to in prerelease is a high status issue.

But I must say, there's something timeless about the false sincerity and synthetic goodwill of meetings, the calculated jocularity, and the simian dominant-male/subordinate-male body language. At least the presence of Karla, Susan, and Amy saved us from the inevitable stripper jokes. Karla pointed out how in marketing meetings at Microsoft, everybody was trying to be fake-perky, and trying to fake having ideas, while at CES, everybody's trying to be fake-sincere and trying to fake not looking desperate.

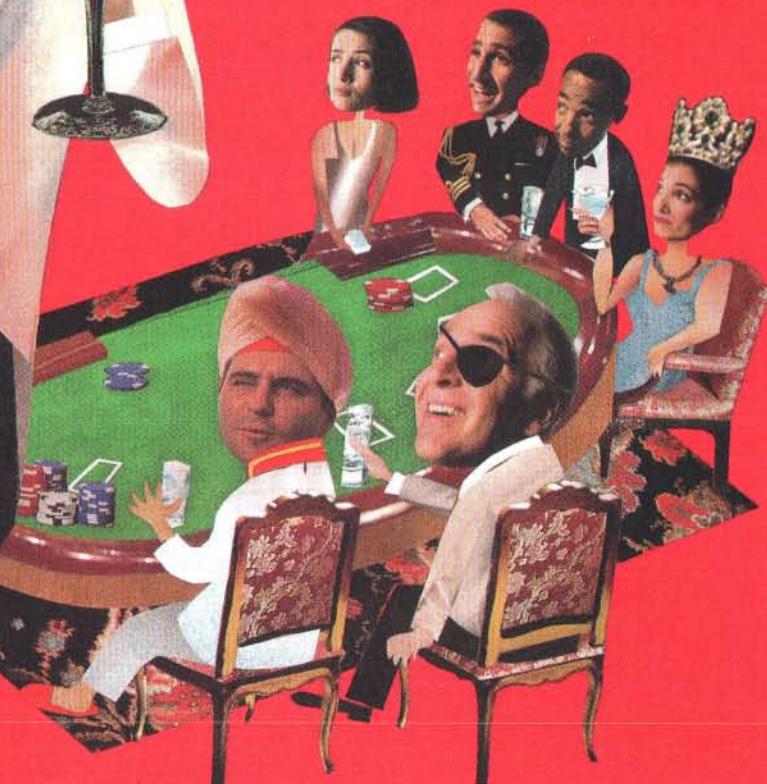
Also, later, during rare, quiet moments, I'd look through the windows at other people's meetings, and they looked like Dutch Master cigar box people, but modernized. Old, but new ... like a cordless phone resting beside a bowl of apples.

Went to about 17 meetings altogether. At CES, everybody name-drops his or her hotel all the time. Hotelmanship is a big CES status issue — people kept on asking us during the day where we were staying. They'd say, "So, uh" (charged moment) "where are you staying?"

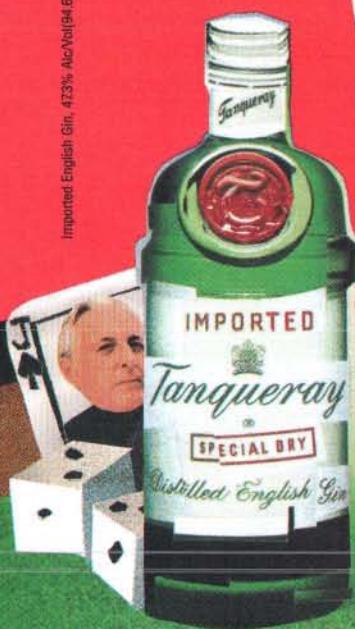
And we'd casually reply, "Oh, the ... Luxor." Las Vegas hotels are similar to videogames — games and hotels both plunder extinct or mythical cultures in pursuit of a franchisable myth with graphic potential: Egypt, Camelot, the Jolly Roger. We found ourselves feeling a little sorry for hotels that couldn't afford to lavishly re-create mythical archetypes or were simply too stupid to realize that the lack of a theme made them indistinguishable. It was as if the boring hotels couldn't figure out what was going on in the bigger scheme of



"Mr. Jenkins sends a T & T to his angry highness in the hope that he will forget how Mr. Jenkins financially castrated him at the baccarat table."



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How refreshingly distinctive.

Western culture. Hotels in Las Vegas need special effects, rides, simulators, morphings... today's hotel must have fantasy systems in place, or it will perish.

The big drama du jour was when Todd caught his Christian fundamentalist parents, who had snuck away to Vegas unaware that their son was here as well, *gambling*... right there on the main floor of the Luxor! They were at the quarter-slot video poker machines, and talk about weird. They were glued to their machines, really scary, like those mean old pensioners who smoke long brown cigarettes and scream at you if they think you might be contaminating their machine's winability karma. Todd ran up and "busted" them, and it was really embarrassing, but also too good to miss. I mean, they were all screaming at each other. Todd was truly freaked out to see his parents so obviously engaging in the "secular" world. And wouldn't you just know it, his parents are staying at our hotel, too; it really seemed like one of those foreign movies that you rent and return half-wound because they're too contrived to be believed, and then real life happens, and you wonder if the Europeans understood everything all along.

Todd came to our room and ranted for a while about what hypocrites his parents were, and it took all my restraint not to remind him that he had "sinned" himself with a Lisa-from-Sony just the previous evening. Karla took him out on the Strip for a walk and I had some peace for the first time all day.

I called Mom from the hotel during this period of peace. I'd turned out all of the lights and closed the curtains in pursuit of sensory deprivation. It was black and sensationless. All there was in the room was my voice and Mom's voice trickling out of the phone's earpiece, and this feeling passed through me - a feeling of what a gift it is that people are able to speak to each other while they're alive. These casual conversations, this familiar voice heard through a Las Vegas hotel room telephone. It was strange to realize that, in one sense, all we are is our voice.



Saturday

BILL was in town launching a new product, and it was so bizarre, seeing his face and hearing his voice over the remote screens

inside the convention floor. It was like being teleported back to eleventh-grade chem class. Like a distant dream. Like a dream of a dream. And people were riveted to his every gesture. I mean riveted, looking at his picture, trying to articulate the charisma, and it was so odd, seeing all of these people, looking at Bill's image, not listening to what he was saying but instead trying to figure out what was his... secret.

But his secret is, I think, that he shows nothing. A poker face doesn't mean showing coolness like James Bond. It means expressing nothingness. This is maybe the core of the nerd dream: the core of power and money that lies at the center of the storm of technology, that doesn't have to express emotion or charisma, because emotion can't be converted into lines of code.

Yet.

I kind of lost focus after a while, and I wandered around and picked up a copy of *The New York Times* lying next to an SGI unit blasting out a flight simulation. There, on the third page of the business section, not even the first, was a story about how Apple shares were going up in value as a result of rumors of an impending three-way buyout by Philips (Holland), Oracle (USA), and Matsushita (Japan). My, how things change. That's all I can think. Apple used to be King

freight boxes to rest our feet and watched the planes fly by. We were both overstimulated.

Karla was fiddling with the Samsung shoelace that held her badge, and she looked up at a plane in the sky and said, "Dan, what does all this stuff tell us about ourselves as humans? What have we gained by externalizing our essence through these consumable electronic units of luxury, comfort, and freedom?"

It's a good question, I thought. I mentioned how weird it was that everybody keeps on asking, "Have you seen anything new? Have you seen anything new?" It's like the mantra of CES.

Oop!, I might add, is going to be a hit. I think this has been lost on everybody in the Las Vegan blur, but it would appear that we're all still employed, and that our risk has become solid equity. But you know what? All I care about is that we're all still together as friends, that we're not enemies, and that we can continue to do cool stuff together. I thought the money would mean something, but it doesn't. It's there, but it's not emotional. It's simply there.

After dark, Karla revealed to me that she, too, was fascinated by the pyramid's laser beam,

Apple used to be King of the Valley, and now it's getting prospected like a start-up. Time frames are so extreme in the tech industry. Life happens at 50 times the normal pace.

of the Valley, and now it's getting prospected like a start-up. Time frames are so extreme in the tech industry. Life happens at 50 times the normal pace.

Todd was off all day having ordeals with his parents, and Bug, Sig, Emmett, and Susan walked around hoping they'd "accidentally" bump into Todd in order to eavesdrop a little, but to no avail.

McCarran Airport is right next to the Strip in Las Vegas, and a plane flies over the city every 11 seconds. Karla and I were walking between pavilions, and we saw Barry Diller in a gray wool suit (and no name tag). We sat down on a riser near the piled-up plywood

so we told everybody we were returning to the hotel next door, and instead drove our rented Altima sedan northeast on Interstate 15, to see how far away we could drive and still see the beam. I had heard that air pilots reported seeing it from LAX. I wondered if astronauts could see the beam from outer space.

It was an overcast night. We drove and drove, and 40 miles out, we realized that we hadn't been paying attention, and the laser beam was gone. We stopped in at a diner for hamburgers and video poker, and we won \$2.25, so we were "a cheeseburger ahead for the evening."

We then got back into the car and drove back toward Las Vegas, and around 26 miles outside of Las Vegas, we were able to see the Luxor's beam of light up in the sky again. We pulled the car over onto the shoulder and

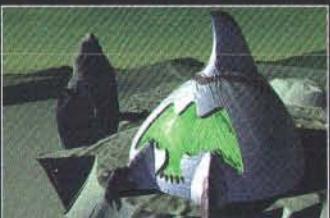


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**Around 26 miles outside of Las Vegas,
we were able to see the Luxor's beam of light up in the sky.
We pulled the car over and gazed at it. It was awe-inspiring and romantic.**

gazed at it. It was awe-inspiring and romantic.

I felt so close to her.

Later, back at the hotel I was PowerBooking my journal entry; I could feel Karla watching me and I got a little self-conscious. I said, "I guess it's sort of futile trying to keep a backup file of my personal memories...."

She said, "Not at all ... because we use so many machines, it's not surprising we should store memories there, as well as in our bodies. The one thing that differentiates human beings from all other creatures on Earth is the externalization of subjective memory – first through notches in trees, then through cave paintings, then through the written word and now through databases of almost otherworldly storage and retrieval power."

Karla said that as our memory multiplies itself seemingly logarithmically, history's pace *feels* faster, it is "accelerating" at an

oddly distorted rate, and will only continue to do so faster and faster. "Soon enough, all human knowledge will be squished into small nubbins the size of pencil erasers that you can pea-shoot at the stars."

I asked, "And ... what then – when the entire memory of the species is as cheap and easily available as pebbles at the beach?"

She said that this is not a frightening question. "It is a question full of awe and wonder and respect. And people being people, they will probably, I imagine, use these new memory pebbles to build new paths."

Like I said ... it was romantic.



Sunday

What happened was this: I was looking out the window, and Todd was fighting with his

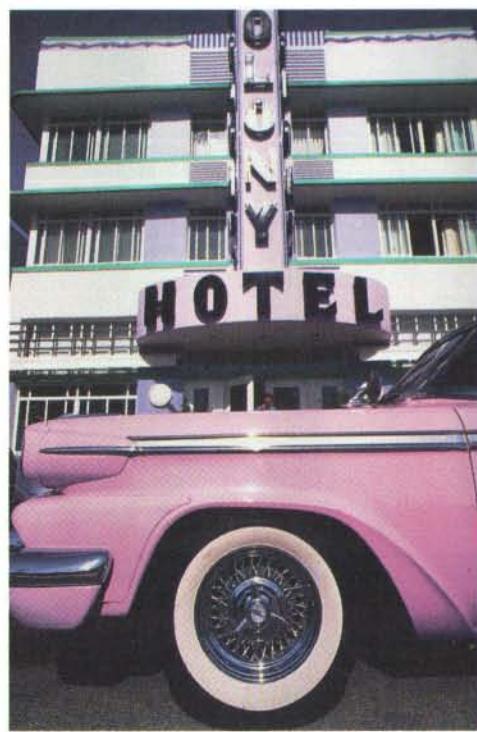
parents out on the Strip, down below the Hacienda's sign. How long was this going to go on? I decided I had to help Todd, and so I went down to see if I could "Stop the Insanity!" Just as I joined them, Karla came running out. We all turned, and I saw her coming, and I could tell something was very, very wrong.

She collected her breath and said, "Dan, I'm really sorry to have to tell you this, but there's been an accident."

I said, "An accident?"

She said that she had just spoken with Ethan in Palo Alto. Mom had had a stroke at her swim class, she was paralyzed, and no one knew what would happen next.

Right there and then, Todd and his parents fell down on their knees and prayed on the Strip. I wondered if they had scraped their knees in their fall, and I wondered what it was to pray, because it was something I



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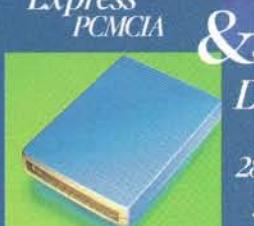
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have never learned to do, and all I remember is falling, something I have talked about and something I was now doing.



Tuesday, January 17, 1995

This is the day of days, and so the telling begins.

Karla massaged Mom's back in Mom's new room beside the kitchen, a room that we filled with her rocks and photos and potpourri and our dog Misty. Misty, buffered by dumbness, unaware of the traffic jams in the blood flow of her master's brain: carbon freeways of cracked cement and flattened Camrys and Isuzus and F-100s; neural survivors as well as those neural victims, all as yet unretrieved from within the overpasses of her Self. Mom's brain is crashed and inert, her limbs as stationary as lemon tree branches on an August afternoon, occasionally twitching, appended by a wedding ring and a Chyx wristband from Amy. Images of a crashed Japan on every channel, the newscaster's voice floating in the background. At least Japan can be rebuilt.

Karla spent the morning massaging the lax folds of Mom's skin. I wonder, is she *there*? It is what I ... we have lived with for over a week, we who look into Mom's eyes and say, *Hello in there*, thinking, *We are here*. Where are you, Mom? Where did you go? *How did you disappear? How did the world steal you? How did you vanish?*

Karla was the first to cross the frontier between words and skin, speech and flesh.

Karla invaded Mom's body. Last week, Karla removed her Nikes, took a plastic squeeze bottle of mineral oil from the bathroom, cut it with sesame oil, and crawled atop Mom's prone form on the foldaway rental bed. She told Dad to watch, told him that *he* was next, and so Dad watched.

Karla dug and sculpted into my mom's body, stretching it as only she knows how, willing sensation into her flesh, into her rhomboids, her triceps, her rotor cuffs, and spaces where probing generated no reaction; Karla, laser-beaming her faith into the body of this woman.

Last week was the beginning, the Confusion, when everything seemed lost, the image of Mom lying frozen and starved of oxygen in the Palo Alto Municipal Swimming Pool haunting us. Ethan meeting us at the hospital, his own skin the color of white fatty bacon embedded with an IV drip; Dusty and Lindsay, Dusty sucking in her breath with fear, turning

open doors you never knew existed



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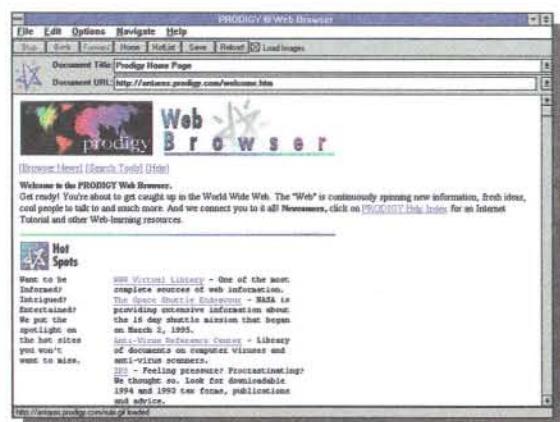
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Talk to her, Dan: tell her ...

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her head from ours, then returning her gaze and offering us Lindsay as consolation.

There had been discussions, a prognosis, pamphlets and counselors, workshops and experts. Mom's functions may one day be complete and may one day be partial, but as of today there's nothing but the twitches and the knowledge that fear is locked inside the body. Her eyes can be opened and closed, but not enough to semaphore messages. She's all wired up and gizmoed; her outside looks like the inside of a Bell switchbox.

What is *her* side of the story? The password has been deleted.

Karla would take Dad's hand over the last week and make it touch Mom, saying, "She is

there and she has never left."

And it was Karla who started us talking to Mom; Mom's eyes fishy, blank, lost and found, requiring an act of faith to presuppose vivid interior dimensions still intact. Karla who made me stare into those faraway eyes and say, *Speak to her, Dan: she can hear you and how can you not look into these eyes that once loved you when you were a baby, and not tell her of your day? Talk to her, Dan: tell her ... today was a day like any other day. We worked. We coded. Our product is doing well, and isn't that just fine?*

And so I told Mom these things.

And so every day, I hold the hand that once held me, so long ago.

And Karla gently guided Dad up onto the foldaway, saying, *Mr. Underwood, roll up your sleeves. Mr. Underwood, your wife is still here, and she has never needed you more.*

And there's Bug, reading Sunday's color comics to Mom, trying hard to make "The Lockhorns" sound funny, then saying to his unresponsive audience, "Oh, Mrs. Underwood, I understand your reaction completely. It's like I'm reading 1970s cocktail napkins out loud to you. I must admit, I've never liked this strip," and then discussing the politics of syndication and which comic strips he finds unfunny: "The Family Circus," "Peanuts," "Ziggy," "Garfield," and "Sally Forth." He's actually more animated than he is in conversations with us.

There is the image of Amy telling rude jokes to Mom and Michael trying to curb the ribaldry but being swept away by the filth, and Michael responding with Pentium jokes.

There is Susan, washing and cutting my mom's hair, saying, "You'll look just like Mary

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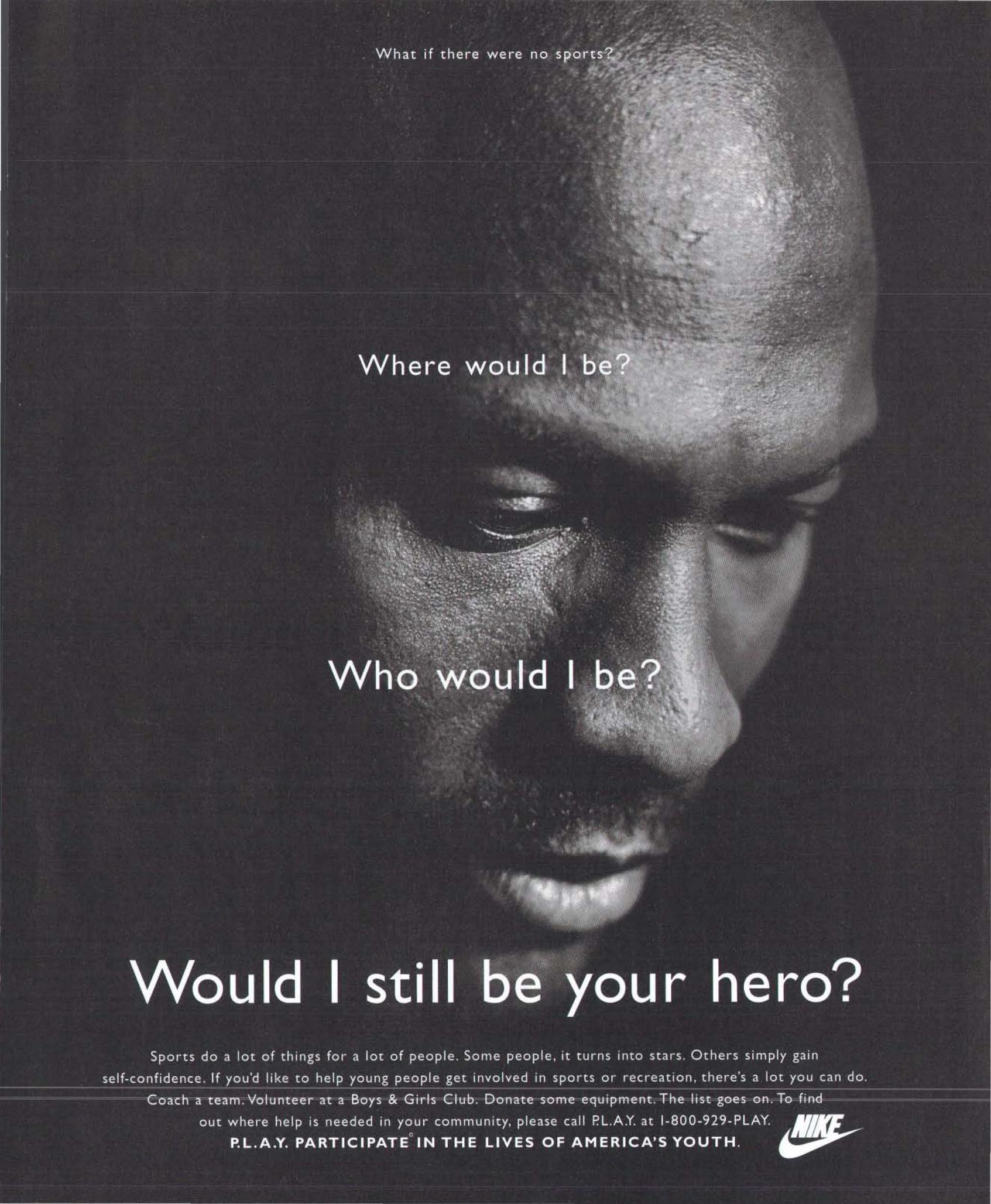
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Tyler Moore, Mrs. U. You'll be a doll," and discussing new postings on the Chyx page.

There is Ethan, Ethan on the brink of erasure himself, saying, "Well, Mrs. U, who'd have thought that I'd be the one to monitor you? Don't tell me it isn't funny. Because it is, and you know it. I'd change your bandages for you, but you don't have any, and that's a big issue here."

There are Dusty and Todd, demonstrating leg-stretching exercises, discussing physiotherapy and how to keep Mom's muscles in tone for the day they again receive their commands.

And there is Abe, who brought in a tub of money, a tub full of coins, and said, "Time to sort some change, Mrs. U. Not much fun for you, but I'll try and be talkative while I sort ... oh look... it's a peso. Woo!"

Last week there was a jolt. Last week Karla said, "You have to go further, Dan, you have to hold her body."

I looked at Mom's body - so long in not holding - and I thought of families who have had to watch a member die slowly and who have said all that can possibly be said to each

other and so all that remains is for them to sit and lie there and nitpick over trivialities or talk about what's on TV. So, I held Mom's body, and told her how my day had gone. I talked about stoplights on Camino Real, line-ups at Fry's, rude telephone operators, traffic on 101, the price of cheese singles at Costco.

This afternoon, this afternoon of the day of days.

I, in this mood where the earthly kingdom was beautiful in spite of life's cruel bite, left home for some hours and took CalTrain and BART over to Oakland just to thwart cabin fever. Sometimes we all forget that the world itself is paradise, and there has been much of late to encourage that amnesia.

Along a roadside I saw an unwound cassette tape, its brown lines shimmying in the sun - sound converted to light. I felt a warm wind's gust on the Oakland BART platform. I suddenly wanted to be home, to be with my family, my friends.

When I got back I was met by Michael, who opened the front door of the house. He told me about a story he had once seen on the

news, a story about a boy with cerebral palsy who had been hooked up to a computer, and the first thing he said, when they asked him what he would like to do, was "to be a pilot."

Michael said to me, "It got me thinking that maybe your mother could be linked into a computer, too, and maybe the touch of her fingers could be connected to a keypad. So, then she could speak to us." And then he saw my face and said, "She could speak to *you*, Dan. I've been doing some reading on the subject. It's called facilitated communication, and it sometimes works."

We entered the kitchen, where Bug and Amy were discussing an idea of Bug's, that "humans don't exist as actual individual selves - rather, there is only the probability of *you* being *you* at any given moment. While you're alive and healthy, the probability remains pretty high, but when you're sick or when you're old, the probability of you being yourself shrinks. The chance of your 'being all there' becomes less and less. When you die, the probability of being 'you' drops to zero."

Amy saw me and said, "Close your eyes right now, this very instant. Try to remember the shirt you're wearing."

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**Last week was the beginning,
the Confusion, when everything seemed lost, the image of Mom lying frozen
and starved of oxygen in the Palo Alto Municipal Swimming Pool haunting us.**

I tried, and couldn't remember.

She said it would probably take me a lot longer than I'd think. "It's a cruel trick of nature that personal memory seems to be the first to go. You'll remember Alka-Seltzer long past the point where you've forgotten your own children."

She then said to me, "Try *not* thinking of peeling an orange. Try *not* imagining the juice running down your fingers, the soft inner part of the peel. The smell. Try and you can't. The brain doesn't process negatives."

I walked onto the back patio and looked over Silicon Valley, clear, but vanishing into a late afternoon fog, unexpected, fanning in from the west. Karla was wearing a sweater, and her breath was like the swimming pool's wafting heat, there in the coolness. I told her that it was always in the fall, when the crops were in, that the wars were called.

She said to me, "We all fall down some day. We all fall down. You've fallen and we'll all pick each other up."

In the distance I saw the Walpert Ridge, and its silhouette was blurred as I confused the mountains for clouds, and Karla dried my eyes with fallen leaves and her sweater's hem. I told Karla about a Lego TV commercial I saw 20 years ago ... a yellow castle and the camera went higher and higher and higher and the castle never ended. She said she had seen it, too.

Dad came by with Misty, and we all went for a walk. Down La Cresta we went, and Dad had brought along the electric garage-door opener, and we pushed its red ridged button, randomly trying to open strangers' doors.



When we returned to the house, my friends

were gathered around Mom, in front of a monitor, their faces lit sky blue; they had forgotten to turn on the lights in the kitchen. Mom's body was upheld by Bug and Abe inside a kitchen chair, with Michael clasping her arms. On the screen of the Mac Classic, in 36-point Helvetica were written the words:

i am here

Dad caressed Mom's forehead and said, "We're here, too, honey." He said, "Michael, can she speak..."

Michael put his arms over Mom's arms, his fingers upon her fingers and assisted her hands above the keyboard. Dad said, "Honey, can you hear us?"

yes



Michael said, "Let's push the caps-lock button.

Capitals make easier words; consider license plates.

You're a California vanity license plate now, Mrs. U."

He said, "How are you? How do you feel?"

;=)

Michael broke in. He said, "Mr. Underwood, ask your wife a question that only she and you would know the answer to. Make me sure that this isn't me doing the talking."

Dad asked, "Honey, what was your name for me, when we went on our honeymoon on Mt. Hood. Can you remember?"

There was a pause and a word emerged:

reindeer

Dad collapsed and cried and fell to his knees at Mom's feet, and Michael said, "Let's push the caps-lock button. Capitals make easier words; consider license plates. You're a California vanity license plate now, Mrs. U."

The caps were locked and the point size lowered. The fingers tapped:

BEEP BEEP

Dad said, "Tell us how you feel ... tell us what we can do..." The fingers tapped:

I FEEL U

I cut through the crowd. I said, "Mom, Mom ... tell me it's you. Tell me something I never liked in my lunch bag at school..." The fingers tapped:

PNUT BUTR

Oh, to speak with the lost! Karla broke in and said, "Mrs. U., our massage ... is it OK? Is it helping you?" The fingers tapped:

GR8

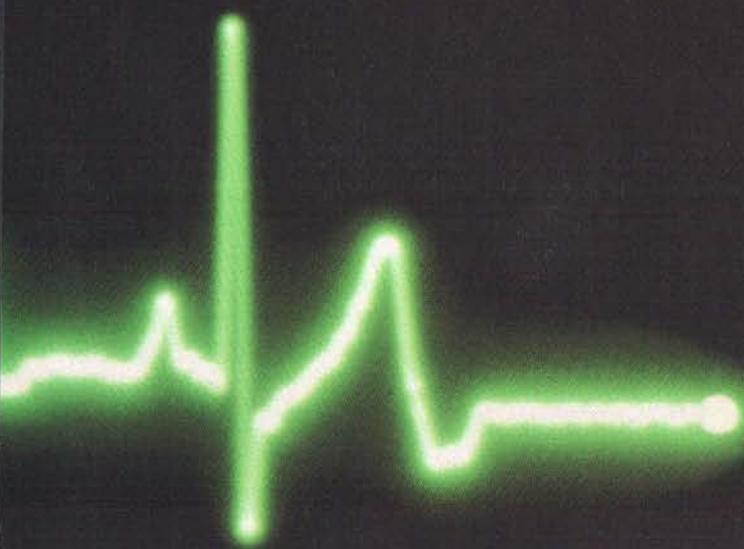
I LK MY BDY

Karla looked at the words and, hesitating a second, declared, "I like my body now, too, Mrs. U." Mom's assisted hands tapped out:

MY DOTTR

Karla lost it then, and then, well /lost it, and then, well everybody started losing it, and at the center of it all was Mom, part woman/part machine, emanating a living blue Macintosh light. ■ ■ ■

Douglas Coupland was born and lives in Vancouver, British Columbia. He is also the author of Generation X, Shampoo Planet, and Life after God.



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Play Games! Get Paid!

Clawing your way up the career path at Nintendo, one level at a time.

By Kevin Hogan

Evning rush hour is in full swing, and Armond Williams wants to kill. He enters Zones arcade in suburban Bellevue, Washington, and steps toward a purposeful cluster of teenage boys. They huddle around a video-game, *Killer Instinct*, the latest coin-op to hypnotize America's youth and probably the one most likely to send Tipper Gore into conniptions.

Following proper house etiquette, Williams places his quarters on the machine's deck and waits. Taking an

unspoken cue to kneel his 6-foot-3 frame into position, he trades a nod with the champion of the moment and has a go at the game.

The pair commences battle on the roof of a post-apocalyptic skyscraper. *Killer Instinct* is a long way from *Pong*. Suggested control-panel moves read like algorithms: ICHI (Ni-San) WITH QP (x5) + QK OR MK. Both

players duck and weave as they pound on a half dozen buttons and two distressed joysticks to make their 3-D-generated counterparts pummel onscreen.

Williams uses Chief Thunder, a steroid-infused hulk with a steel-plated mohawk and a real bad attitude. His pimply faced opponent was kicking butt and taking names with the nasty yet beautiful B. Orchid, a secret agent clad in neon-green body armor.

Thunder makes quick dispatch of B. Orchid, hurtling her to certain, if temporary, death over the side of the high-rise. This surprises and amazes the gathered audience: these kids aren't used to seeing an old guy like Williams, who is 25, kick such serious ass.

After a particularly manic attack complete with hatchet flutters and a soul-splitting shriek to the heavens, a spectator breaks down and asks Williams during a pause in the action, "How the fuck d'ya do that?"

Same way you get to Carnegie Hall, Billy Boy. And if you're real good, you'll get paid to do it. Armond Williams is a game tester at Nintendo of America Inc. in Redmond,

Washington – a subsidiary of Japan's Nintendo Co. Ltd., the US\$4.7 billion, 800-pound, necktied Kong of the videogame industry.

That's right: he plays videogames for a living. In fact, he plays games so much and so well, he's been promoted. NOA pays hundreds of gamers living in greater Seattle to not only play all day but talk on the phone at the same time. God bless America! Take that, you Microserfs!

Nintendo of America, with its 1,300 employees, is just one of eight subsidiaries of parent company Nintendo Co. Ltd.; Williams works for NOA's Product Acquisition and Development Testing department. They will bug-test approximately two dozen titles this year. Some of the titles tested are developed in-house, some are translations of games produced by the parent company, and the rest are accepted after testing from more than 600 licensees around the world.

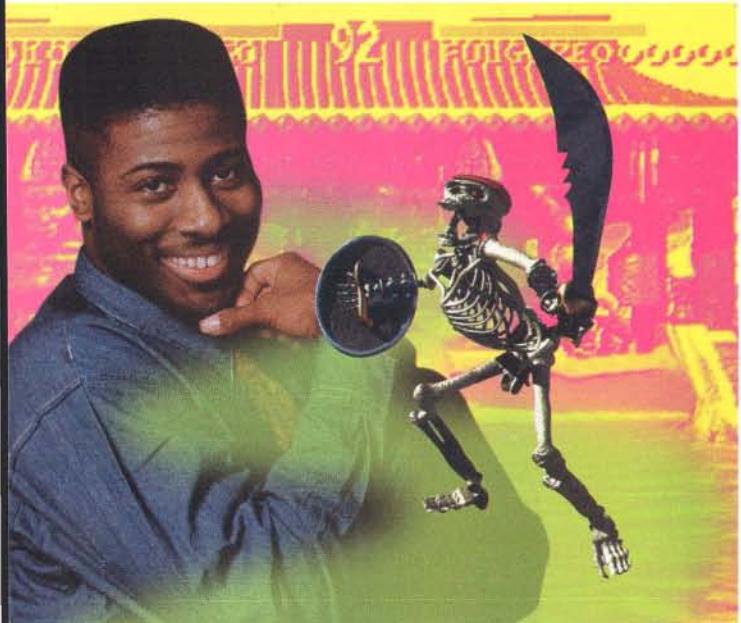
The testing staff fluctuates between eight and twelve, depending on release schedules and product cycles. Achieving the status of tester is not easy. These are the cream of a game-playing, phone-answering crop 450-strong inside Nintendo's Call Center – some have been clocking hours since the late '80s to become Nintendo's game-playing élite.

It would be tempting to clump the testers into a nerdy-Gen-X/slacker stereotype since most are in their mid-to-late 20s and male. But a closer inspection exposes distinct differences: well-fed longhairs with a yen for role-playing adventure games sit next to sweat-shirted jocks who prefer street fighting or sports titles.

The one defining characteristic among testers and tester wannabes is what draws Williams into Zones arcade after the proverbial long day at the office – the love of the kill, the solution, the win.

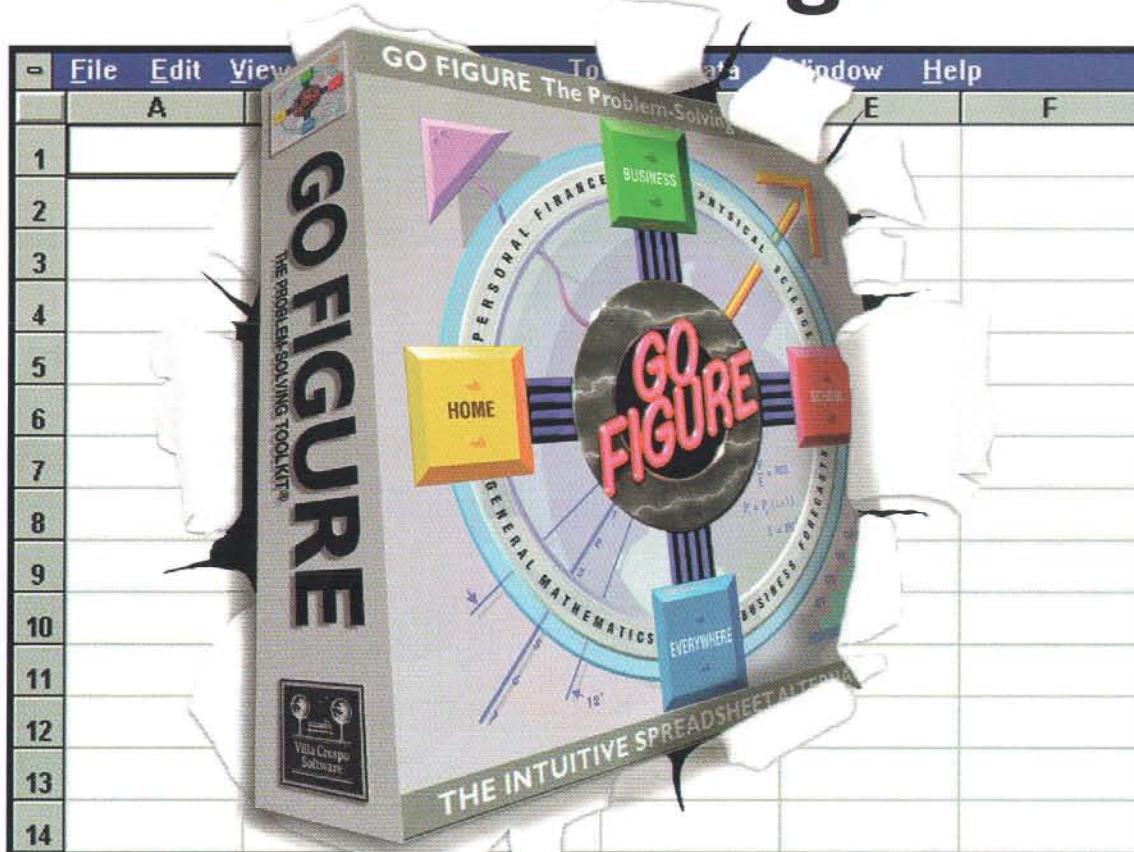
Twenty years ago, there was no such thing as a game tester – Parcheesi was self-explanatory, and too much craps would get you arrested or dead. But in the stretch of one generation, the videogame industry that collects \$15 billion annually has also created thousands of adolescent dream jobs in which you play around all day and get a paycheck at the end of the week.

While visions of NOA's Redmond headquarters might take on a Willy Wonka-meets-Mission Control mystic, in reality the offices are decidedly businesslike. Inside the two-story, mirrored bread box (the center of the corporate-park campus) are rows of cubicles outfitted with beige carpeting and track lighting. A raised walkway over an expansive parking lot connects a second, twin building known to employees as the Call Center.



Armond Williams
spends all day at
the office playing
videogames, yet
he can't help but
drop by an arcade
on his way home
to show 'em how
it's really done.

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porate-park campus) are rows of cubicles outfitted with beige carpeting and track lighting. A raised walkway over an expansive parking lot connects a second, twin building known informally to NOA employees as the Call Center.

More cubicles fill the second floor of the Call Center in groups of four and six. This is where Williams and everyone else start their Nintendo career. And it is where Megan Faris multitasks daily. Faris is a 28-year-old Seattle native who could play one of those grinning MCI operators in the TV commercials. She sits in cubicle #245 with telephone headset, NEC workstation, and Sony Trinitron paused on the 10th level of *Super Tetris*. Above her head hangs a telecaster with a long number of waiting calls and an exact accounting of the time the calls have been on hold. The callers are waiting to hear from either one of Nintendo's call service representatives or gameplay counselors.

Faris is what is known at NOA as a super agent. She handles incoming calls on Nintendo's hot lines, sometimes in French, which she speaks fluently. Service reps take basic consumer service questions culled from Nintendo's 1-800 number. Technophobic parents often call the day after Christmas as they try to plug in the Super NES machine. Sometimes it's a kid looking to renew his *Nintendo Power* magazine subscription.

Counselors handle a different breed of

the game are you?

Caller: I'm only one sorcerer into the upper tundra.

Counselor: Do you mean the upper tower? [Three minutes later]

Counselor: [Not as chirpy] You can't get a bottle by throwing at rubies.

Caller: Where do you go to get one?

Counselor: Well, that depends on which bottle you're looking for.

Caller: I have one from the village. Now I'm looking for the fourth one.

Counselor: Oh, you won't get the fourth one for a while. The one that you *can* get is, when you go to the lake in the light world....

Caller: Yeah?

Counselor: And swim up the river that goes to the castle? Swim under the bridge. Once you swim under the bridge, you should be able to find the bottle.

Caller: Really?

Counselor: Yup.

Caller: Cool. Thanks.

Like many jobs involving shift work, turnover in the Call Center can be high: counselors must handle anxious and sometimes irate customers. College students use the flexible hours to work around classes. Some operators who might have more to their lives than just a videogame addiction seem content with mastering *Mario* while on the clock. Others start to show not only gaming

Super agents handle calls from technophobic parents, who often call the day after Christmas as they try to set up the Super NES machine for their kids.

caller. This is where the title "counselor" really fits the job description. Frustrated game players with sore thumbs and grinding headaches call a \$1-a-minute 900 number to try to cull tips or secrets that will help win or solve a game. (Purists who insist on mastering games on their own would call it telecheating.) Since 1986, Nintendo operators have answered almost 44 million calls for information or service. Conversations like the following are fielded by Faris and a fluctuating staff of up to 450 agents from 4 a.m. to midnight, 565 days a year:

Caller: Um, How do you get to the, um, the, the....

Counselor: The what?

Caller: The uh....

Counselor: [In chirpy voice] How far into

talent but a passion to join the corporate fold and become Nintendo lifers.

Faris has been playing videogames since she started on Atari as a teenager, and quickly learned to master most every title ever made for that platform. She applied to Nintendo like most of her co-workers, after noticing an ad in the local paper.

She likes the flexibility of her schedule because it lets her take post-graduate public relations classes at night. "I like it right where I am," says Faris. "The callers always keep the job interesting. Also, you can't beat the work environment. The people here *want* you to play around."

Faris can see herself staying with Nintendo but perhaps moving to another department on an administrative level. According to Don

James, vice president in charge of product acquisitions and testing, 90 percent of NOA's employees rise through the ranks at the Call Center. Nintendo's corporate culture is one that makes people want to stick around — after all, no one is making widgets here; they're creating games.

While Faris seems to enjoy her job well enough, she doesn't harbor the same ambitions as Mark Coates. Another well-scrubbed member of the Call Center, Coates is a center team leader, overseeing and helping service reps and counselors. A counselor since 1989, he knows the inner workings of the Call Center and introduces other old-timers with excited camaraderie as he comes across on a tour through the cubicles.

Ask Coates why he likes working for Nintendo so much and he replies in what seems like a bit of contrived and coached job-interview lingo: "There is great opportunity and stability with Nintendo. The work environment is fun, and I'm able to be part of a team."

But the truth comes out when he talks about the games. Coates's eyes brighten, he begins to gesture enthusiastically, and he loses the corporate-speak when talking about his favorite titles in the Call Center's library. He describes gleefully how, along with an employee handbook and an identification card, the company hands you an NES, Super NES, and a Gameboy upon hire.

Nintendo encourages game playing as much as possible — at work and at home — whenever and wherever you can. The library lends a Nintendo catalog of more than 1,600 titles, from *Aero Fighters* to *Zero the Kamikaze Squirrel*, for use at work or the home office. Coates, along with Williams and a few others, define points in their lives with respective game title releases.

Williams, Coates, Faris et alia are bright, college-educated twentysomethings who in years before *Pong* could have started their way up the ladder in any white-collar field and found considerable success. They aren't strung-out genius millionaires like some of their Microsoft neighbors. They are regular people with extraordinary jobs.

Some gamers border on the obsessive. *Killer Instinct* always draws a crowd in Cafe Mario, Nintendo's cafeteria and free arcade. There are reports of employees finishing eight-hour shifts at the company only to head to the *Killer Instinct* machine until midnight, sleep in their cars, and be right back at it when the doors open again at four in the morning.

While Coates won't cop to slumber parties

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2000 AD



1500 AD



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in the parking lot, he does admit to taking his work home. "Sometimes, my wife will want to go out to dinner or to a movie, and I'll put her off until I've finished another level or two. But now, she pulls the same thing with me!"

Recently married, Coates is starting to think about the long haul. He sees Nintendo as a career option. The money can be very decent. Nobody talks directly about salaries, but with semiannual bonus incentives, gamers can pull in more than \$30,000 a year. Yet it seems that what Coates really wants to be at Nintendo is a tester.

Within the pool of service reps and counselors in the game center, certain players gain reputations for their prowess in different game categories. Games tend to fall into the following schools: role-playing, puzzles, sports, action-adventure, and street-fighting. Guess which discipline Armond Williams studied? "With the street-fighting games, it's definitely the stereotypical man thing. Come and try to beat me. You want to impress the people out there - beat everybody's butt. I just happen to have the knack and the interest."

When Williams started working at NOA in June 1990, he didn't take the job too serious-

ly. After a few months of playing games and getting paid, he quit and went back to school at a local community college. But he eventually tired of the books, realized where his passions ran, and returned to Nintendo with an agenda: don't play around. He played the

Nobody talks directly about salaries, but with semiannual bonus incentives, Nintendo gamers can pull in more than \$30,000 a year.

game incessantly, knowing each move and character inside and out.

"*Street Fighter II* was in the arcade at the time, and I was spending all my waking hours playing. When I heard during training that the game was going to come out for the Super NES, I was stoked."

When Williams graduated training a second time in 1992, he was asked if he would

write fight scenarios ("You have now entered the dark chamber") and proofread instructions for the *Street Fighter II Turbo* guide.

Williams and a few other chosen ones were again called over the walkway to corporate offices in June 1994. This is where the magic happens. A cluster of offices and conference rooms, named the Treehouse after Donkey Kong's digs, is accessible only with proper security clearance. The three games under development at the time were *Killer Instinct*, *Uniracers*, and *Donkey Kong Country*, the huge NOA release last year.

The Treehouse is where the brain trust of producers, consultants, licensees, and execs formulate and decide the fate of Donkey and Diddy Kong. And this is where *Donkey Kong Country* was nurtured into the fastest-selling game in videogame history, pushing 500,000 units in its first week in release and well over 7.5 million copies to date.

Williams describes the moment that playing a game became work. "They said, 'Well, you'll be down here playing *Donkey Kong Country* and, just to let you know, you'll be playing the game quite a bit.' And I said, 'Yeah, I know.' And they said, 'No, you'll be

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// The full circle has 80 segments
 int slices = (int (sweep) * 80) / 360;
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 while (startang < 0)
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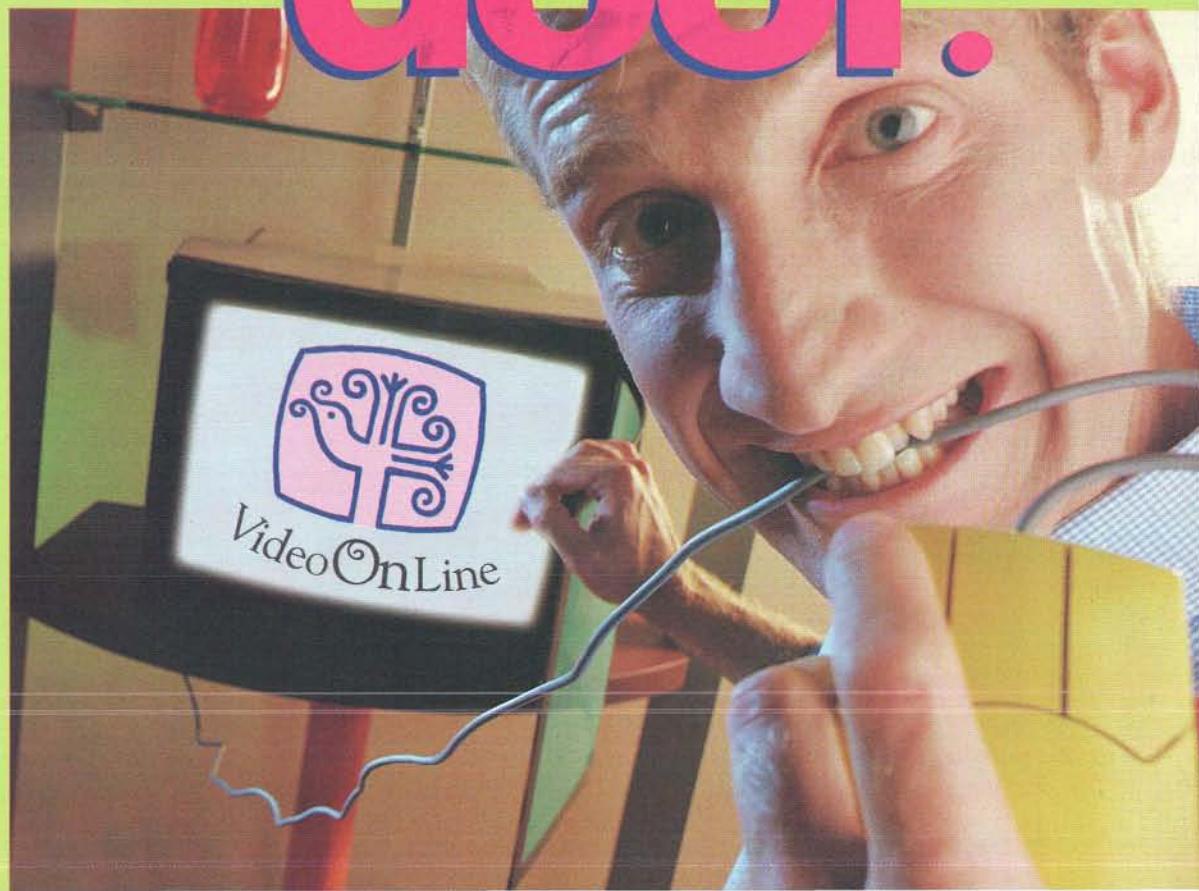
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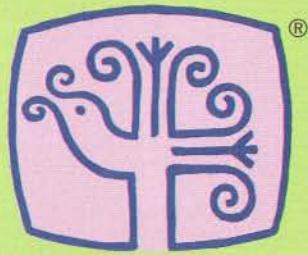
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playing this game *a lot*. And I did. I can play the entirety of *DK Country* and find every prize within an hour."

Williams's most recent project was *Earthbound*, a role-playing game produced in Japan. Before the game can be released to a North American market, everything needs to be translated and fit into the text boxes. The cute little boys and girls with happy little colors in *Earthbound* don't exactly enthrall Williams like the slash and burn of *Killer Instinct* – but hey, that's why they call it a job.

Williams lives with his cousin in Kirkland, Washington, eight minutes from work. Although he won't say that his job is his life, the two seem inextricably combined. When *Mortal Kombat* and *Street Fighter* were the rage, he'd allot a couple of hours each day on the weekend to go out and play. Williams still follows the same regimen whenever a new title is released.

"I'll run through it a few times. Glean some information from my fellows on the Internet, learn the new moves and everything." He doesn't play videogames at home for work – unless he's really backed up on a certain project. "If I don't have the time to play it at

work, I'll ask to take it home with me, and practice there."

Williams is used to the wide-eyed glares he gets when talking about his job. "Let's say I'll meet someone at a nightclub and the icebreaker will be a question like, 'What do

The cute little boys and girls with happy little colors in *Earthbound* don't exactly enthrall Williams – but hey, that's why they call it a job.

you do?' I'll say I work for Nintendo. Then they'll ask the inevitable. 'Wait a minute. You mean you play games or something?'

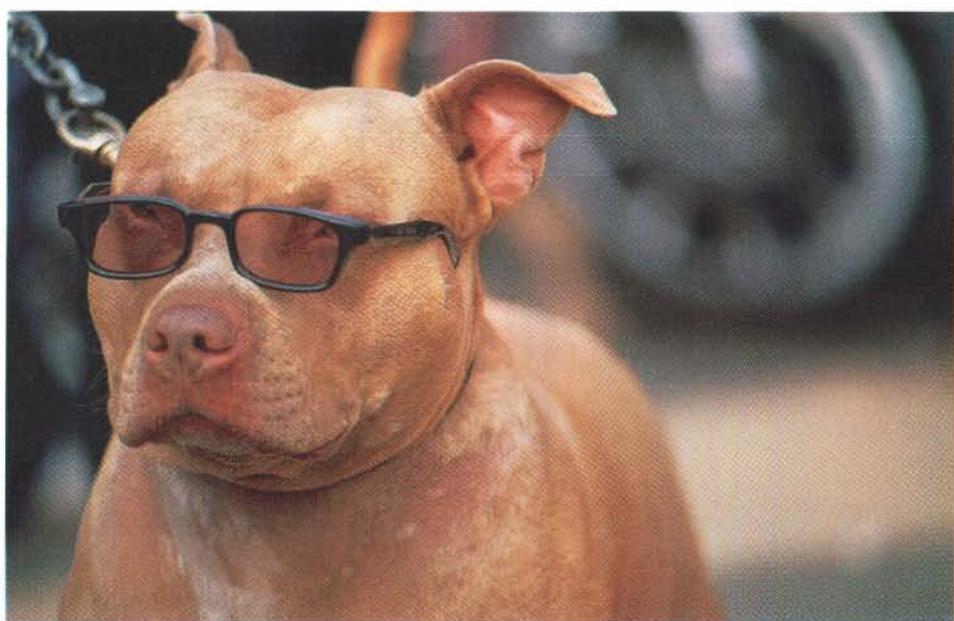
"I don't get paid a king's salary, but it pays the bills. When I tell people that, they can't knock it. My brother and friends think it's great. They'll call me up for some tips. My mom and dad don't care just as long as I'm staying out of trouble and am independent."

Williams is cool about his feelings for the job, but his happy hour activities belie that nonchalance. Back in Zones, Williams finishes schooling the teenagers on *Killer Instinct* to take a tour of the rest of the arcade. He points out rows of old machines from his past, now cast in unplugged corners next to *Pac-Man* and *Asteroids*. Each abandoned game is another milestone, another step along his career path.

Williams is the last guy you would expect to get weepy. But as he rattles through the games of his youth, he sounds like a high school All-American reminiscing on past games and what those early days mean to him now. "When *Street Fighter II* came out, I was there. When *Mortal Kombat I* and *II* came out, I was there. It goes without saying that when *Mortal Kombat III* comes out – I'm there, dude. And I'm gonna do whatever it takes to know that game inside and out, to be the one to beat."

Kevin Hogan is a freelance writer who can't get past the Poison Pond in Donkey Kong Country to save his life. Any pointers can be sent to nagoh@well.com.

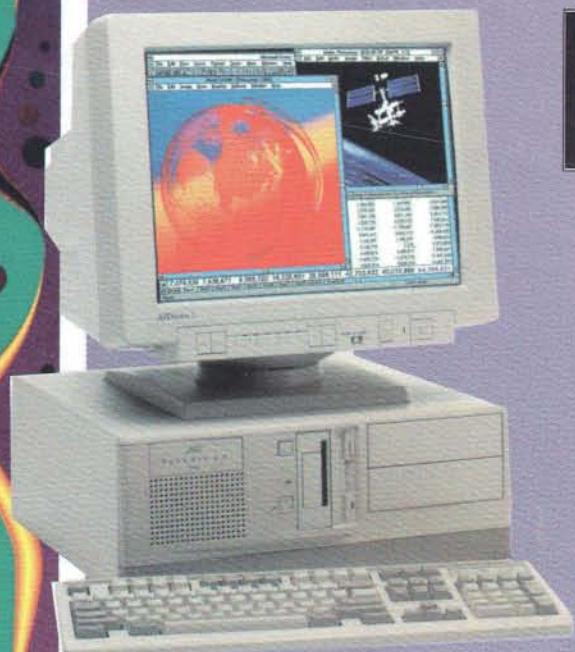
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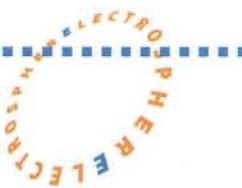
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The Medium Is the Medium

Reaching across time and space to connect with another's spirit, Madame Blavatsky would have understood the Net perfectly – 100 years ago.

By Jon Katz

The next time you're alone in a room at night with only the hum of your computer for company, your face eerily lit by nothing but the screen, light a candle, close your eyes, wait, and listen. If you have patience, faith, an introspective bent, and spiritual yearning, you might

receive a gruff but transcendent message from the late Madame Blavatsky, a 19th-century spiritualist, medium, and mystic. She died more than 100 years ago, but her spirit, as they say, lives on.

If she contacts you, don't be alarmed. Be nice and respectful. She can get huffy with skeptics. And don't be surprised if you hear an other-worldly shriek. That would be her baboon laughing.

A famous collection of stuffed animals graced her parlor — a lioness' head over the door, monkeys peering out of nooks and crannies, birds perched in every corner. But none was as elegant or charismatic as her baboon, which stood upright, dressed in the appropriate Victorian manner — wing-collar, morning coat, and tie — and carrying under one arm the manuscript of a lecture on *The Origin of Species* by Charles Darwin.

All this has been wondrously chronicled in a new book by Peter Washington, *Madame Blavatsky's Baboon: A History of the Mystics, Mediums, and Misfits Who Brought Spiritualism to America* (Shocked Books, US\$27.50).

As an associate of a spiritualist, the baboon was a statement against Darwin. Which is not to say Madame Blavatsky was not very much a scientist, fascinated by technology and hoping to forge a new kind of spiritual fusion between religion and science. One likes to think that she would have feasted on the Net, but she might as easily have hated it, filled as it is with a rich assortment of skeptics, mystics, cranks, shamans, spiritualists, and oddballs. Still, once Blavatsky realized that there were credit-

card-owning "seekers" out there, she would probably have logged on for the ride.

The Net encompasses many strange things, but those who use it often and understand it well know it has a rich and haunting mystical side. Along with pornographers and teenagers, it attracts deeply religious people of countless denominations engaged in extraordinary searches into their own and others' souls. Ascetics, heretics, and true-believers searching for God (or his or her equivalent) flourish in zines, religious and mystical conferences, and on bulletin boards. Online séances, and laden, unexpected messages multiply into the ether. Some newsgroups focus on Germanic paganism, others on religious life in various parts of England; still others offer everything from religious books and products to diverse spiritual communities.

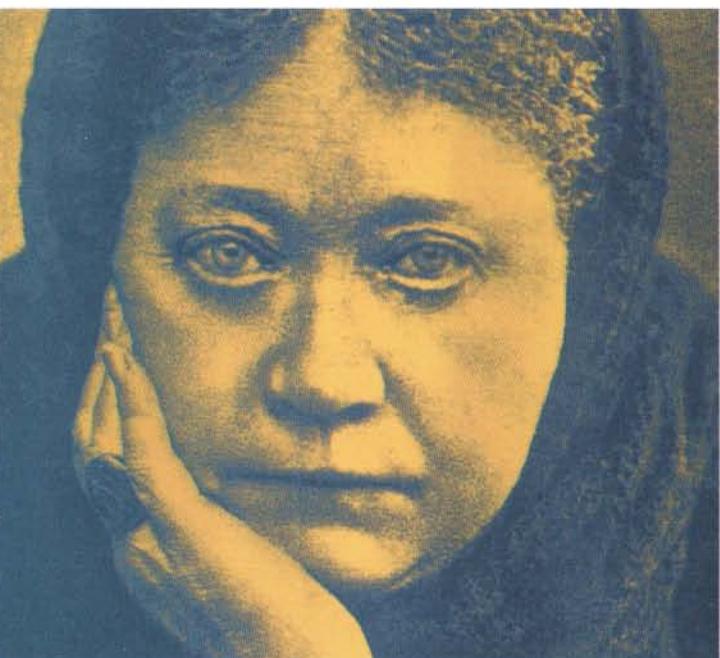
It's the spiritual side of the digital world that is little known and little explored by the legions of puzzled journalists who pore over the computer culture in search of fresh dangers to warn readers and viewers about. Yet, in some ways, it's potentially one of the most significant parts. The ability of one person's spirit to reach across space and connect with another's is, to many, a spiritual act in itself. And the business of sending and receiving messages has always been a core notion of mysticism and spirituality. Countless millions believe, or want to believe, that there are larger forces at work in the universe. And they want to chat with them.

Helena Petrovna Blavatsky, like all great spiritual entrepreneurs, intuitively understood this. She led one of those spectacular, romantic, bizarre lives that could come only from another time. Born a Russian aristocrat in 1831, Blavatsky was a mystic child, not a Cleaver or a Brady. Her description of her childhood in a letter to a friend is a classic.

"My childhood? Spoilt and petted on one side, punished and hardened on the other. Slick and ever dying til seven or eight, sleep-walker; possessed by the devil. Governesses, two.... Nurses — any number.... One was half a Tartar. Father's soldiers taking care of me.... Lived in Saratow when grandfather was Civil Governor, before that in Astrachan, where he had many thousands (some 80,000 or 100,000) Kalmuck Buddhists under him."

Speculation about her life — some of it assembled by distant relatives and followers — includes numerous mystical encounters during her time in America and Europe: meetings with Native Americans, long journeys by wagon through the West, joining Garibaldi's army in the Battle of

Born a Russian aristocrat, Helena Blavatsky led one of those spectacular, romantic, bizarre lives that could come only from another time.



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Mentana (where she allegedly suffered sabre and bullet wounds), and a shipwreck off the Greek coast at Spetsai. Add to these spectacular scrapes run-ins with Egyptian cabbalists, Mexican bandits, *vodun* magicians from America's South, and Asian spies.

Blavatsky is widely credited with ushering in the age of spiritualism. It is a legacy that causes many to gag. But the philosophy still sells gazillions of books, tapes, herbs, rocks, crystals and it has, like it or not, evolved into a major American quasi-religious movement – one that offers important alternatives to often hierarchical, remote, or arrogant religious and medical institutions.

These days, Blavatsky would be a business enterprise: she would set aides to answering her voluminous e-mail; host a regular show on public television; pitch VCRs, channeling tools, and healing crystals over the Home Shopping Network; host online séances; record messages for her 800-PSYCHIC hot lines; and write bestselling paperbacks.

She would have drooled over 20th-century marketing possibilities. In her time, mystics and shamans had to be content with conjuring up spirits and voices, hustling true-believers for pennies in darkened parlors, and separating society people from their

Like it or not, our books, heroes, villains, TV shows, music, perceptions of propriety, property, gender, and family, as well as our moral and legal boundaries, all bear this stamp, shaped by Him and His supposed teachings. Yet even though the notion of God pervades our culture, there is surprisingly little discussion about our belief in His existence: questions about God have all but disappeared from mainstream media, cropping up only rarely in peripheral or specialized publications and books. God has always been our biggest story – but it's one of our most poorly and gingerly covered – at least in America. Presidents are asked what kind of underwear they wear on national television, but frank discussions about God are practically unheard of in newspapers or on evening news broadcasts these days. A newspaper editor who ran a feature questioning the existence of God would be looking for work before the second edition hit the lawn. Commercial television is filled with miracle cures and near-death experiences, but you'll never see a story that challenges or questions much theology on *20/20*.

A news medium can say whether church attendance is up or down and in recent years, even report on priests and ministers who get into trouble. But the main event – Is He Real

America would be a harsher, less interesting place without the legions of Madame Blavatsky descendants, many of whom offer us gentle, hopeful paths through life's challenges.

money. From spiritualist to televangelist, the line between the mystic truth teller and the con artist has always been tenuous in America. We've always wanted that extra bit of afterlife insurance in this world and are often willing to overlook the hustle that goes on in the hope that there still might be some truth to the message.

Madame Blavatsky was no exception. Like the best mystics, gurus, and spiritual salespeople, she seemed to lose track herself of precisely what was true and what wasn't. But she never lost track of this: we all, at some point, have to deal with this God business. The idea of God is ubiquitous. It shapes our lives more than most of us even realize. It permeates media, technology, sexuality, education, culture, and politics; it shapes what our society sees as permissible or forbidden, what we can do and what is taboo.

Or Not? – is virtually out of bounds as doctrinaire faith declines.

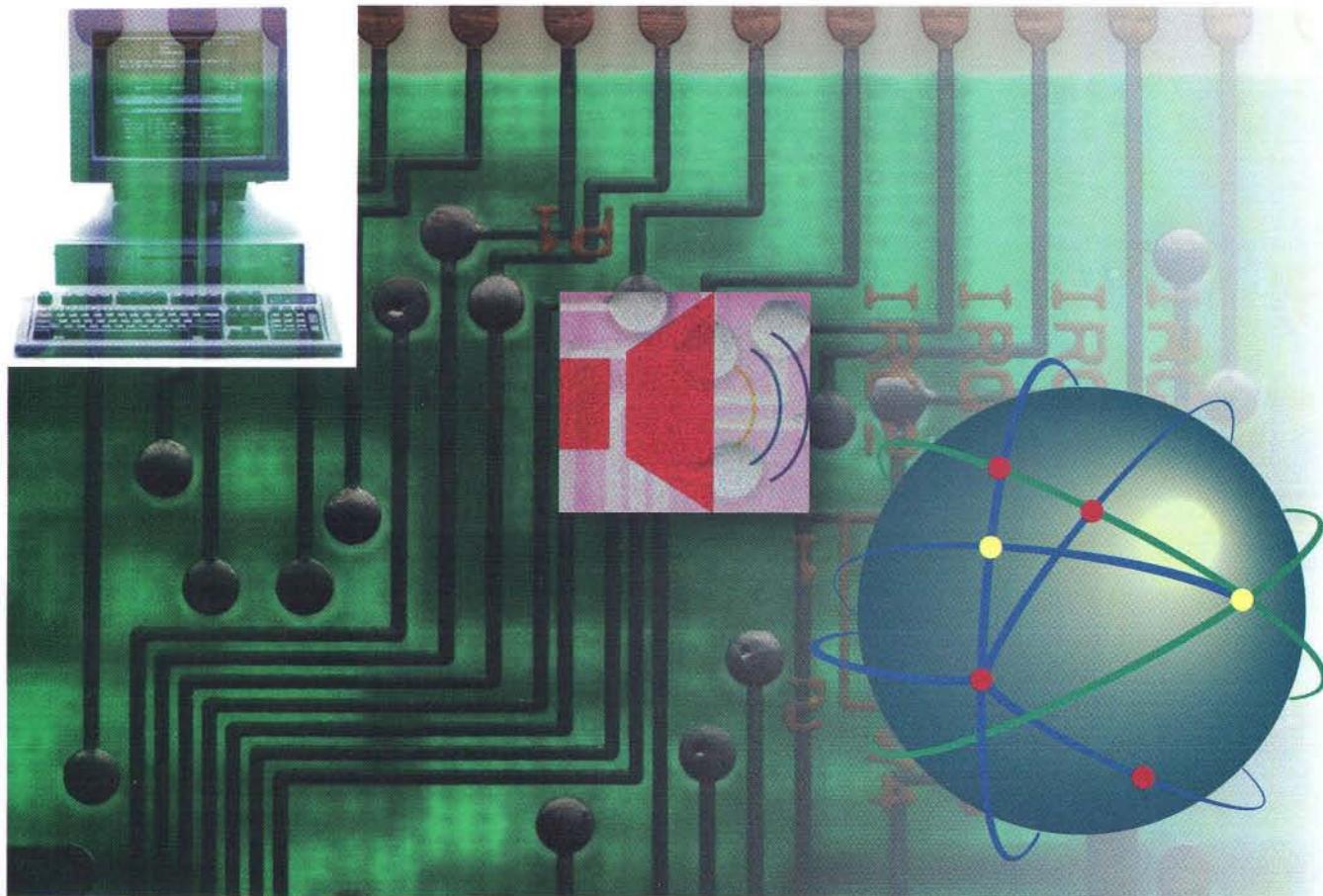
Yet even lost belief lingers, perhaps making the cultural landscape more fertile for the likes of Madame Blavatsky, who, a century ago, dared to reject contemporary notions of God and offered up her own.

It is not exactly clear how Madame Blavatsky came to America in 1873 or so (she talked of exotic but doubtful adventures in the Far East en route), but she claimed it was through the Brotherhood of Himalayan Masters, who chose her to communicate their message to the waiting world.

We owe them for that. They sent us one of the most vivid and idiosyncratic characters of that century. And America would surely be a harsher, less interesting place without the legions of Madame Blavatsky descendants,

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**Blavatsky founded the Theosophical Society,
which influenced a rich cast of 19th- and 20th-century thinkers,
including Oscar Wilde, George Bernard Shaw, Frank Lloyd Wright,
and even, indirectly, Mahatma Gandhi.**

many of whom offer us gentle, hopeful paths through life's many challenges.

For Blavatsky, America was the right place at the right time. She was magnificently exotic, with piercing eyes and a taste for turbans and badly fitted robes. A chain-smoker who carried her cigarette materials in a furry pouch made from an animal's head, her hands were decked with rings. The effect, writes Peter Washington, was "a badly wrapped and glittering parcel." She talked incessantly in a rich and guttural voice, always careful to make clear that all communications, messages, and directions from the Masters come through her.

Madame Blavatsky was fascinated by science and technology, but horrified by Darwin's conclusions — she saw them not as

blasphemous but as demeaning to the human spirit. Man was descended, she claimed, from spirit beings from the moon, not apes — thus her spiffy, satirical baboon.

When she arrived in New York in the summer of 1873, Madame Blavatsky was destitute and forced to live in a hostel for working women. She later settled in a New York City apartment and found a wealthy and generous gentleman believer — Colonel Henry Olcott. She went on to found the Theosophical Society, which spawned competing sects in the subsequent flowering of spiritualism. The movement evolved in a number of ways, eventually influencing a rich and international cast of 19th- and 20th-century writers, visionaries and philosophers, from Rudolf Steiner to G. I. Gurdjieff, Oscar Wilde, W. B.

Yeats, George Bernard Shaw, Frank Lloyd Wright, and even, indirectly, Mahatma Gandhi. These were disparate thinkers and seekers with one common human desire: they wanted an alternative to Western materialism and conventional Christian spirituality.

Theosophy (the movement that still exists today) calls itself a spiritual science. It offers a large body of religious knowledge acquired and transmitted by spiritual means, and it teaches spiritual methods that are designed to promote enlightenment through prayer, study, and meditation.

Madame Blavatsky, shrouded in dark robes and plain shawls, worshiped Master Morya, whom she identified as a member of the Great White Brotherhood of Masters. The Masters, she professed, can "inhabit material

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For Blavatsky, the technology is almost beside the point.

Her vanishing doors and sliding bookcases were only the machinery through which she communicated – call it her Victorian equivalent of the modem.

or semi-material bodies at will" and possess extraordinary clairvoyant skills.

Communicating with one another by means of a sort of cosmic radio, they form a link between human beings and the chiefs of the divine cosmos-ruling hierarchy. According to Madame Blavatsky, the brotherhood remains hidden from all but a few; she was one of the few and charged accordingly.

It's tough not to connect longstanding and deeply held spiritual searching with new ways to message. From Jefferson to Edison to Blavatsky to Yeats to Marconi to McLuhan, philosophers and scientists have long been entranced by the notion of moving across time and space. The old-fashioned parlor séance conducted by Madame Blavatsky isn't so far removed from the many online

topics and postings of her legatees.

Notwithstanding the contemporary clucking about the onrushing Orwellian world of disconnected screen addicts, mind-to-mind meetings on the Net can often be exotic, satisfying, and wonderful. We, too, can instantly call up and connect with lost, distant, and missing people – today's analog to last century's spirits. Since we don't know what the person we're talking to looks, sounds, smells, dresses like, we connect with the pure spirit only, just as mystics claim to do.

This miraculous ability to connect is inevitably obscured by the gleaming, humming machinery that makes it possible. But for Madame Blavatsky, the technology is almost beside the point. Her vanishing doors and sliding bookcases were only the machin-

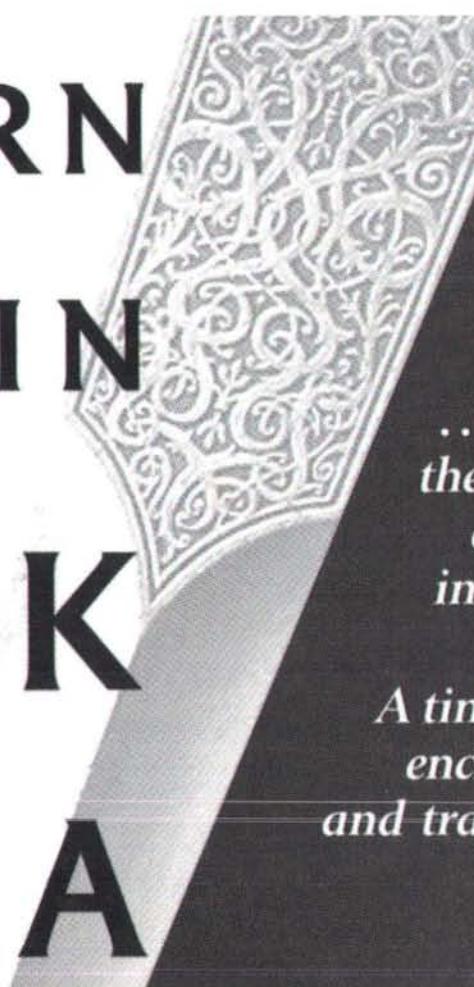
ery through which she communicated – call it her Victorian equivalent of the modem. In fact, she would have taken particular joy in the idea that the medium is the message.

The late 1800s was a transitional time for religion in America. Organized churches had faltered, while spiritualism and mysticism became alternatives. We're in a similar period today: established faiths remain powerful, but are tired, politicized, and as confused as the rest of us. New ideas and original thinking are erupting outside of convention and sacred text. Technology and science continue to collide with dogma and doctrine, in some cases transcending both in terms of their ability to uplift and connect.

As were the Victorians, modern Americans are spiritually hungry. The truth is, most of

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Unfortunately for Madame Blavatsky, intrigue and politics within her movement tarnished her reputation and marred her spiritual explorations. She fled the United States and eventually took her movement to India, where feuding remained incessant among followers, fellow theosophists, and the gullible who gave her money. All sorts of stories and rumors followed her, plagued her, and sullied the public's view of her. A disgruntled employee claimed to have compromising letters. Other evidence strongly suggested Madame Blavatsky had set up phenomena to fool the public by using elaborate fake wall panels and manipulating dolls in the semi-darkness that she worked in to provide the Master's apparitions. She died in Europe, broke, lonely, and abandoned by most of her own movement.

Blavatsky is vaguely remembered today by mystics and theosophists and a few historians of the period, but she is virtually unknown to most Americans, particularly members of mainstream religions.

Madame Blavatsky's *Baboon* ought to change all that. It's a wonderful read — funny, poignant, richly researched and written. It opens a forgotten window to the now-ubiquitous seekers of spirituality in American life. The book tends to bog down once Madame Blavatsky passes away, but that's probably unavoidable — few of the spiritualists discussed in the book who followed her are any match for her.

So listen for her the next time you're out trawling the Net. And listen and watch for her cackling baboon, forever waving his cautionary finger at those who place machinery and science above the dignity and mysteries of the human spirit. ■ ■ ■

Jon Katz is *Wired's* media critic. He can be e-mailed at jkatz@aol.com.

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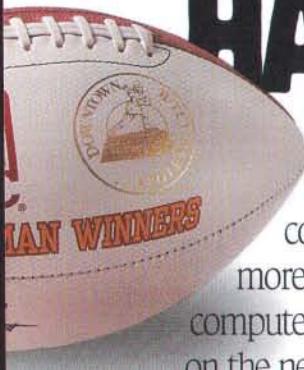
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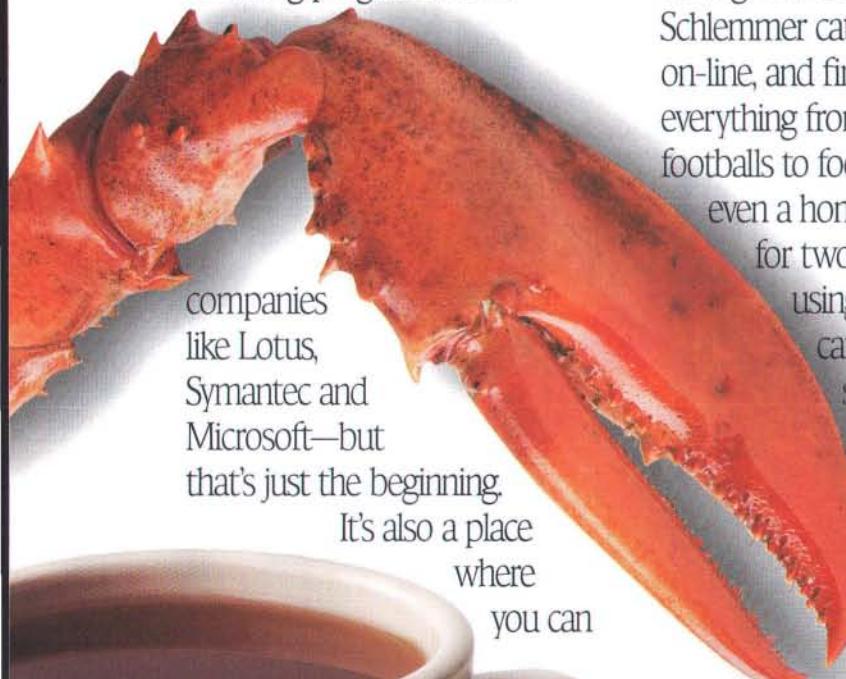


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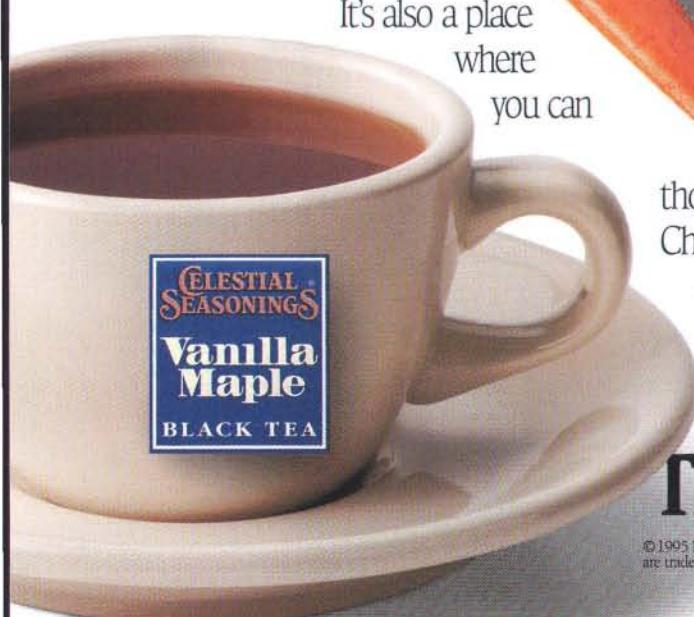
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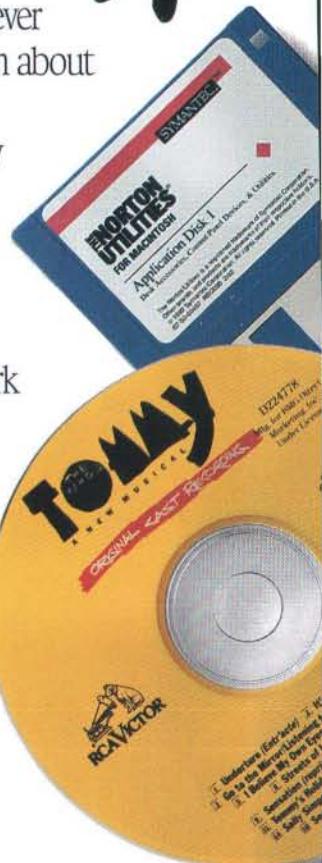
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Another cool thing about the Internet is the lack of all this legal fineprint...for now.

In Search of the Grail

By Richard Thieme

For Moses, it was a burning bush. For Buddha, it happened under the bo tree. For me, it was playing a game of *Hitchhiker's Guide to the Galaxy* with my son.

As we made our way past babble fish and Vogon poetry readings, I discovered that what happens when we play a game of interactive fiction is not what happens when we read a book. The difference is not of degree but of kind. Information is organized differently – but more importantly, after the game, I am organized differently. I experience myself differently. I frame things differently.

The maze of branching possibilities offered by a computer game creates the illusion of an endless set of options. As I explore, my experience of that

maze becomes a metaphor for self-experience. Recursion, the powerful engine of the computer program, becomes a metaphor for my own growth as well. My capacity to

include and transcend myself at each stage of growth finds an analog in the game: I no longer think of life as an open book but as a fractal, a spiral, rather than a straight line. Linear-printed text implies a logical progression. In contrast, interactive computer games create a space seemingly without horizons, finite yet unbounded.

What I experienced in a small way while playing with my son is a shift in our entire culture. Our transition from a print culture to a digital one is as profound a shift in human consciousness as that created by the move from oral culture to written, or written to printed. Our interaction with computers has given birth to new forms of religious community.

The interactive quest, a symbolic journey in search of a grail, is the dominant genre in cyberspace. Whether in a sin-

gle-player game like *Myst* or a MUD, this quest begins when we cross the threshold from this world into the magical realm of our inner growth; we leave behind the world of rational logic and enter the underworld with its shadows, caverns, and mazes. In this underground world, we speak in riddles and puzzles, the language of dreams and the unconscious. We change shapes, undergo transformations. The quest in all of its forms is a spiritual journey framed by archetypal symbols of both good and evil.

Marianne Moore wrote that poems are imaginary gardens with real toads in them. The Net is an imaginary web providing real connection with real people, in a remarkably new way. On the Net, the absence of visual cues for race, gender, disability, and age enables us to create personae that simultaneously hide and disclose who we are, making community on the Net remarkably inclusive. By disarming the usual cues that trigger exclusion, the Net becomes a come-as-you-are party, a cultural feast to which everyone is invited.

The Net is one source of the mutuality, feedback, and accountability that we need to counteract the rigidity and isolation of modern life. We will need that feedback and mutuality even more as our planet continues to evolve. Our galaxy contains countless civilizations that will one day make the racial diversity on Earth look like bland homogeneity. The Net is a step in the right direction; it's one way to learn how to live in relationship to the unthinkable complexity and diversity that will characterize future communities.

Richard Thieme (rthieme@mixcom.com) is a professional speaker and business consultant. He specializes in the impact of technology, the transformation of organizations, diversity, and the intersection of the stock market, UFOs, and religion.

The Net is an imagined territory with a real spirituality in it.

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The Net Net on Net Films: Crapola

By Scott Rosenberg

A"reclusive systems analyst" accidentally stumbles on a secret program and gets tangled in a murder plot. A "group of young computer buffs" gets framed for a crime and sets out to prove its innocence. A serial killer stalks his victims online.

Look out: the Net movies are coming. These are the high-concept plot lines for three movie projects now underway: Columbia's *The Net*, MGM/UA's *Hackers*, and Disney's *f2f*. And, of course, everyone has a favorite cast in mind for *The Kevin Mitnick Story*.

But if past experience is any indication, the Net you see on the big screen will only dimly resemble the one netheads know and love, live and breathe.

The film industry usually operates on an 18- to 24-month lag behind the rest of the media, so

the Internet frenzy that began last year won't surface in the movies until later this year. And like virtual reality before it, the Internet will suffer a sea change along the way from real life to celluloid. If you're unhappy about the mainstream media's obsession with cyberporn, credit card theft, and interactive marketing, wait till you get a load of the Net according to Hollywood.

A moviemaker typically sees a computer and thinks "plot device." Tiny, powerful, and arcane to the average moviegoer, the microchip is the ultimate MacGuffin, the nickname Alfred Hitchcock gave to the portable object (it hardly mattered what it was) that everyone in a movie was chasing.

This little slip on the keyboard could start a nuclear war (*Wargames*). This little circuit board could crack any computer security system in the world (*Sneakers*). This little VR device can turn an idiot into a megalomaniac (*Lawnmower Man*). Keep your eye on it!

Hollywood is about to unleash three clueless films about the Net.

In other words, despite the Internet's trendiness, today's digital technology – and the informational power it represents in the world – hasn't been explored in movies at all. From hacker adventures like *Wargames* and *Sneakers*, to power thrillers like *Clear and Present Danger* and *Disclosure*, to horror stinkers like *Lawnmower Man* and *Brainscan*, Hollywood has presented computers and networks as arenas for the usual kinds of psychokiller plots and playgrounds for paranoid fantasies of gadgetry run amok that we've been seeing for the last 40 years.

The old Frankenstein's monster and sorcerer's apprentice paradigms keep getting recycled. Meanwhile, the world moves on. If the past quarter century has demonstrated anything, it's that the dangers and opportunities inherent in computer technology don't have much to do with the sort of out-of-control, artificially intelligent robots that Hollywood

shows seizing power from frail, flesh-and-blood human beings. Instead, both danger and possibility lie in the ability of massively networked systems to hook together weak, breathing human beings everywhere, transforming society in radically new ways that both

thrill and scare us – it's a scenario that might make for some visionary movies, as well.

The era of mainframe computing found its Stanley Kubrick ultimate cinematic expression in 2001's HAL 9000, the brainy supercomputer in charge of a spaceship en route to Jupiter. HAL develops a bug and starts killing members of the crew. Keeping tabs on his human companions through Cyclopean, red machine-eyes and speaking in unctuously serene tones, HAL embodied the techno fears of the '50s and '60s: infallible computers were going to get bigger and smarter and develop devious humanoid personalities. Then they'd stop being infallible and turn on us.

HAL was a perfect image of terror when computing meant room-sized IBM iron tended by blue-suited priests. Hal was perhaps most terrifying to audiences because he seemed to have near-human emotions himself and revealed a sort of psychotic despair that somehow we could relate to. Even now, it's eerily touching to hear this computer pleading, serenely but desperately, not to be shut down: "Just what do you think you're doing, Dave? I know everything hasn't been quite right with me. I feel much better now, I really do. Look, Dave, I can see you're really upset about this. I honestly think you ought to sit down calmly, take a stress pill, and think things over." (The trouble was with the crew member's wetware – at least that's the way HAL saw it.)

No movie computer since has matched the resonant originality of HAL. Probably because writers and directors haven't tapped the kind of eerie humanity HAL seemed to have. There have been only forgettably cheesy clones, like the big brain in *Colossus: The Forbin Project* (1970) and versions of PCs that always look a little off, as if an art director decided that an electronic device millions of people use every day needs to be prettier and dumbed-down to be comprehensible. HAL is now more than 25 years old – in microprocessorland, that's several geological epochs – and Hollywood still hasn't found a credible replacement.

Despite the Net's trendiness, technology hasn't been explored in movies at all.

The new Net films aren't likely to change that. A killer using an online account and a password doesn't tell us anything new or interesting about our world; it's just the same old "Dial M for Murder" formula that's been played out in dozens of movies over the last few decades. Only now it's being played out on AOL.

The important issues raised by globally networked computing – information overload, decentralization, supermobile marketplaces, and destabilization of governments – haven't registered on Hollywood's radar. Though a superficial awareness of cyberspace and its implications has begun to penetrate the deepest recesses of movieland decision making, the studios remain surprisingly timid about making films that reflect it in any authentic way.

Maybe it's just that no Hollywood insider has been inspired enough to figure out how to incorporate a digital-age perspective into a movie plot. Or maybe the studios are less eager to make movies open to the full complexities of a technological revolution that's transforming their own bailiwick along with everyone else's. Considering how broadly the new communications landscape is beginning to reshape the movie business, it's remarkable how little these changes have been reflected in what we see on screen. It's as if the studios hope that, if they just pretend that nothing terribly important is going on, they won't have to adjust the end-product or evolve their art.

In the next couple of years, we can expect no end of stock movie plots ported into cyberspace: we'll get our fill of romantic triangles and monster capers and slasher stories and teen comedies. Hollywood isn't going to rewrite its whole playbook just because a new medium has emerged, and that's too bad. The few writers and directors who do take risks, and who do dare to explore new ways of reflecting the digital revolution, will probably realize great profits and popular acclaim, because their work will resonate with the truth of a changing age.

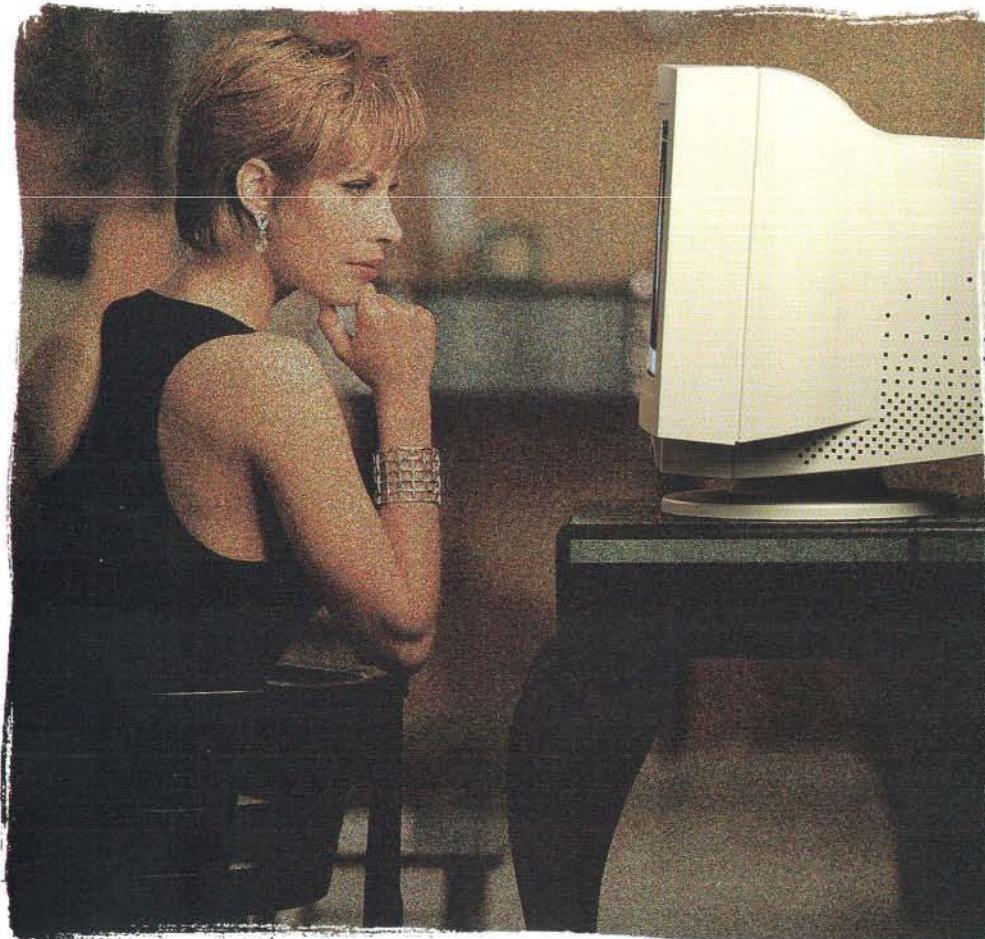
The outlook isn't totally glum. Stanley Kubrick is working on a movie called *AI* for release sometime next holiday season, and his track record is awfully good. And *Johnny Mnemonic*, the much-awaited and long-delayed Columbia and Tristar movie of William Gibson's short story (directed by artist Robert Longo) is finally slated for an early summer release and could turn into a big hit.

Mostly, though, we're still waiting for the artists who can capture the experience of networked communications, who can limn Net life in memorable images the way *2001* distilled the early space age or *Citizen Kane* caught the soul of a newspaper baron. Somehow, the digital era must evolve from a Hollywood backdrop into a creative theme. Screen computers must progress from MacGuffin-hood to metaphor. The world is changing, and the movies risk irrelevance unless they capture what those changes mean.

The first film to do so is probably out there already, in the head or on the hard drive of some ambitious writer-director without a credit to his or her name. Today's cliffhanger: Is there a young studio exec with the vision and guts to give such a project the green light?

San Francisco Examiner movie critic Scott Rosenberg (scottros@well.sf.ca.us) writes frequently on digital culture.

EUROPEAN ART COMES TO THE SCREEN, WITHOUT THOSE ANNOYING SUBTITLES.



From the continent that gave us museums and luxury automobiles comes their combined spiritual equivalent: Nokia monitors. Nokia is already a household name (and café and office name too) throughout Europe. And now Nokia

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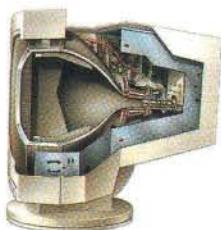
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REVOLUTIONARY EVOLUTIONIST

In the cluttered back room of Richard Dawkins's Oxford flat, a Macintosh morphs through the image of a human skull evolving. Over and over, the huge prognathic jaw shrivels as the cranial cavity swells to grotesquely large proportions: tiny brain, monster brain.

"This is what our skulls might look like in thousands of years," Dawkins remarks, glancing at the screen, "should we be around that long." That same trend applied to Dawkins's own skull produces the image shown on the cover of this magazine.

But even without futuristic morphing, Dawkins's head holds more provocative ideas than most. Two decades ago, Dawkins presented a radical evolutionary perspective in a small book called *The Selfish Gene*, a disturbingly persuasive essay arguing that living things are little more than corporal vessels impelled to heed the primal dictates of selfish genes hellbent on their own replication and propagation. Much as the English philosopher and novelist Samuel Butler observed a century ago that a chicken is just a way an egg makes another egg, Dawkins proposed that we are nothing but expressions of our selfish genes in the process of making more selfish genes. Taking that idea even further, Dawkins proposed that genes themselves are expressions of particularly elegant code manipulating the world around it to its own reproductive end. He extended these notions into culture and described *ideas* as competing, self-replicating entities he called memes. Dawkins's most recent book, *River Out of Eden* (see excerpt), extends

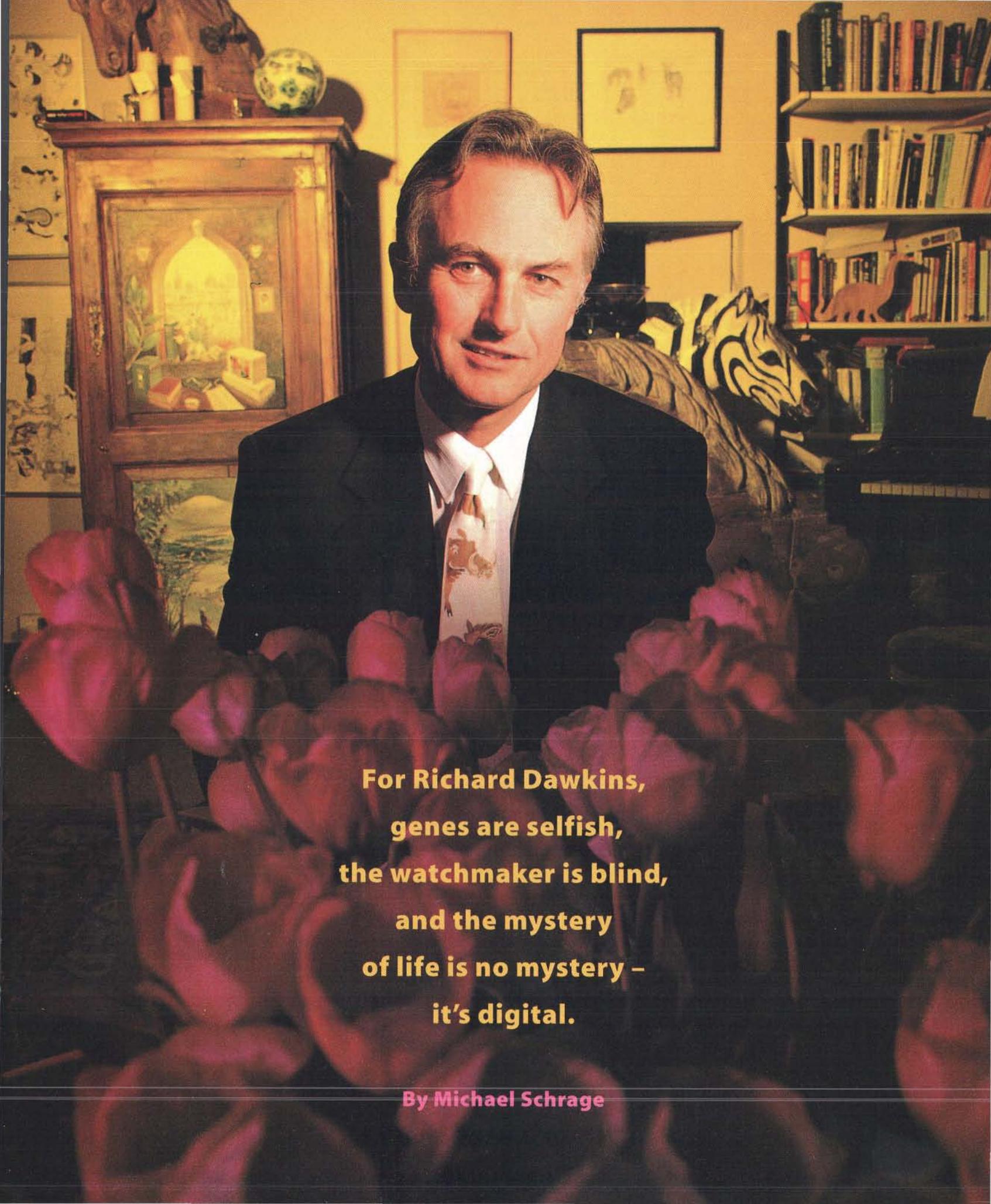
his life's work into a unified evolutionary theory arguing that all life, at its core, is a process of digital-information transfer.

These ideas are intriguing, even a little outrageous, but – most importantly – they have proven astonishingly influential. When a Dawkins meme smacks into your neurons, your neurons obediently repattern themselves around it. You might resist their explicit message, but they are difficult to ignore and impossible to dismiss. They're quite fit – in the Darwinian sense.

Dawkins's revolutionary evolutionary rhetoric has particularly inspired researchers of artificial life. Indeed, Dawkins's work has created new contexts for exploring genetic algorithms and has sensitized the growing community of artificial-life researchers to the evolutionary dynamics of their software creations. Much as Herbert Simon and Marvin Minsky framed the agenda for artificial intelligence, Richard Dawkins has effectively defined the evolutionary agendas for artificial life. If you want to understand the future of natural and synthetic evolution, you have to read Richard Dawkins.

The morphing skulls are just a taste of Dawkins's designs on synthetic evolution. Other randomly selected signs of digital Darwinism are strewn throughout Dawkins's apartment. The seat cushions for the wooden chairs are immaculately embroidered with images of color biomorphs – polychromatic representations of progeny that Dawkins first bred a decade ago with his own home-brewed artificial life program. So, don't sit on them. They were lovingly sewn by Lalla Ward – Dawkins's third wife – best known in Britain as Romana, the comely assistant to the BBC's *Dr. Who* but perhaps more proud of her role as Ophelia in a BBC production of *Hamlet*. She and Dawkins were introduced at a party by Douglas Adams, author of the science fiction classic

A Media Lab Fellow, Michael Schrage is the author of the newly published *No More Teams! – The Dynamics of Creative Collaboration* (Doubleday Currency).



**For Richard Dawkins,
genes are selfish,
the watchmaker is blind,
and the mystery
of life is no mystery –
it's digital.**

By Michael Schrage

The Hitchhiker's Guide to the Galaxy. Small world.

The biomorphs are reminiscent of the musings of D'Arcy Thompson, the British biologist of natural forms. Completely aware of the innate ability of computers to replicate data patterns, in 1984 Dawkins decided to play God and write a simple program to generate treelike structures on his Apple II. He called them biomorphs – living structures. He determined the “fitness” of the image and tried to breed aesthetically charming virtual trees. But the program birthed much more than stately elms or magnolias. Dawkins described the excitement of his discovery of synthetic life forms in *The Blind Watchmaker*: “When I wrote this program, I never thought that it would evolve anything more than a variety of treelike shapes. I had hoped for weeping willows, cedars of Lebanon, Lombardy poplars, seaweeds, perhaps deer antlers. Nothing in my biologist's intuition, nothing in my 20 years experience of programming computers, and nothing in my wildest dreams prepared me for what actually emerged on screen. I can't remember exactly when in the sequence it first began to dawn on me that an evolved resemblance to something like an insect was possible. With a wild surmise, I began to breed, generation after generation, from whichever child looked most like an insect. My incredulity grew in parallel with the evolving resemblance.... I still cannot conceal from you my feeling of exultation as I first watched these exquisite creatures emerging before my eyes. I distinctly heard the triumphal opening chords of 'Also Sprach Zarathustra' (the 2001 theme) in my mind. I couldn't eat, and that night 'my' insects swarmed behind my eyelids as I tried to sleep.”

Perhaps the most amusing pastiche of synthetic biology to grace the Dawkins household is the beautifully carved wooden horses. Most are charming refugees from carnival carousels. A few of the weathered animals go back to the '50s. Are these simply a charming Dawkins eccentricity? Not at all. By sheer happenstance, it turns out, Lally's mother had been collecting them for decades. Now they're stabled – along with the biomorphs and the simulated skulls – in the Dawkins home. It all seems quite natural. Really.

In the living room, Dawkins picks up a scrapbook and flips through it to read from a letter written to him about *The Blind Watchmaker*, his pop explanation of natural selection. The letter, from a New Zealand academic, reads: “One of my most capable students confessed that she had been reduced to tears by your book. She felt that any religious belief was now impossible to her, as it had been logically disproved.”

The academic was kind enough to enclose his reply to the student, which Dawkins reads aloud: “When Lenin traveled through Germany earlier this century, the Germans permitted him only to travel in a sealed, locked train – on the condition that he proceeded nonstop from the one border post to the other. They clearly recognized his persuasiveness and power of his ideas and their capacity to produce unhappiness. I respectfully request that you don't lend Dawkins's book to anybody for the same reasons.”

While his tone skids teeteringly close to the brink of smugness, Dawkins never quite makes it over the edge. His is more the pride of craft than ego. The letter writer is, of course, absolutely correct. Dawkins is a dangerous man. Without question, Richard Dawkins is the most brilliant and compelling propagandist of Darwin today. His rhetoric inspires even as it provokes. He is a veritable Tom Paine of evolution, an uncompromising champion of the brute force of natural selection, ruthlessly dismissive of those who question evolution's essential truth. Creationists who believe in the divinity of natural design, of course, might think him more a Goebbels.

But for Dawkins there is nothing left to argue: genes are selfish; the watchmaker is blind. To say otherwise, he insists, betrays the truth. Cherished concepts like “free will” and “spirituality” live in the dark, helical shadows of our genes. He has roused the ire of England's religious communities by publicly expressing his view that theology is nothing other than a pseudo-intellectual grab bag of charming myths. Dawkins is a fiery evangelist for atheism.

His metaphors, his prose, and his ideas burn with a rational passion that simultaneously overwhelms and disarms. He is not a scientist

THE DIGITAL

All organisms that have ever lived – every animal and plant, all bacteria and all fungi, every creeping thing, and all readers of these words – can look back at their ancestors and make the following proud claim: Not a single one of our ancestors died in infancy. They all reached adulthood, and every single one successfully copulated. Not a single one of our ancestors was felled by an enemy, or by a virus, or by a misjudged footprint on a cliff edge, before bringing at least one child into the world. Thousands of our ancestors' contemporaries failed in all these respects,

but not a single solitary one of our ancestors failed in any of them. These statements are blindingly obvious, yet from them much follows: much that is curious and unexpected, much that explains and much that astonishes.

Since all organisms inherit all their genes from their successful ancestors, all organisms tend to possess successful genes. They have what it takes to become ancestors – and that means to survive and reproduce. This is why organisms tend to inherit genes with a propensity to build a well-designed machine – a body that actively works as if it is striving to become an ancestor. That is why birds are so good at flying, fish so good at swimming, monkeys so

RIVER

There is a river out of

good at climbing, viruses so good at spreading. That is why we love life and love sex and love children. It is because we all, without a single exception, inherit all our genes from an unbroken line of successful ancestors. The world becomes full of organisms that have what it takes to become ancestors. That, in a sentence, is Darwinism.

There is a river out of Eden, and it flows through time, not space. It is a river of DNA – a river of information, not a river of bones and tissues: a river of abstract instructions for building bodies, not a river of solid bodies themselves. The information passes through bodies and affects them, but it is

not affected by them on its way through.

I speak of a river of genes, but I could equally well speak of a band of good companions marching through geological time. All the genes of one breeding population are, in the long run, companions of each other. In the short run, they sit in individual bodies and are temporarily more intimate companions of the other genes sharing each body. Genes survive down the ages only if they are good at building bodies that are good at living and reproducing in the particular way of life chosen by the species. But there is more to it than this. To be good at surviving, a gene must be good at working together with the other

haunted by self-doubt. There are moments in his speech, manner, and texts when he comes across as completely uncompromising in all of his firmly held beliefs as any Bishop Wilberforce. Even Harvard's well-known evolutionist and Darwin booster, Stephen Jay Gould, is a Darwinian softie by Dawkins's hard standards.

And Dawkins has been extremely effective in probing the boundaries between natural evolution and artificial evolution as created in computers. Indeed, Dawkins's thought suggests that the distinctions between natural evolution and artificial evolution are *themselves* artificial. Evolution is truly transcendental, he argues: Darwin's dynamics are as universal, as profound, and as potentially explosive as $E=mc^2$.

This transcendental nature of evolution has bred several new fields of computer science that have a biological feel to them. One of these fields is called computational biology; it focuses on using *genetic algorithms* and other formulas that imitate genetic breeding for replicating the effects of evolution in ordinary computer chips. The stronger form is artificial life; it attempts to simulate all the essential traits of life – not just evolution – using silicon (and other substrates) instead of carbon. A-life researchers believe life is an information process that can be ported from one matrix to another.

In fact, computational pioneers like Danny Hillis and Stanford University's John Koza now actively explore software that breeds other software. Instead of software engineering as the paradigm of software design, they want to apply Darwin's theories to grow software that grows solutions. The rise of cheap processors and parallel architectures creates the ideal digital ecosystems to spawn software rather than build it. Nature – not rational cognitive planning – becomes the guiding force for the next generation of software solutions.

With his skillful articulation of evolutionary issues – combined with his digital breeding of biomorphs – many researchers consider Dawkins a conceptual godfather of the artificial life movement. He is as comfortable with digital media as with the genetics of fruit flies. He

hacks software as readily as he hacks zoology. He wrote his own word processor for the old Apple II and documented the decision processes of baby chicks. With his multimedia, multispecies fluency, Dawkins knows that artificial life has as many insights to offer biology as biology does artificial life.

A shy man with quick movements, Dawkins circles questions warily – almost distrustfully. He is cautious and disciplined. Conversation is not a game. He first pokes at ideas rather than plays with them. He is almost the caricature of the Oxford don – extraordinarily well read with a command of language that moves easily between forcefulness and nuance, with a dry wit that tends toward the droll.

Leon Lederman, the physicist and Nobel laureate, once half-jokingly remarked that the real goal of physics was to come up with an equation that could explain the universe but still be small enough to fit on a T-shirt. In that spirit, Dawkins offered up his own T-shirt slogan for the ongoing evolution revolution: **LIFE RESULTS FROM THE NON-RANDOM SURVIVAL OF RANDOMLY VARYING REPLICATORS**. Expect to see it on grad student T-shirts everywhere from Oxford and MIT to the Santa Fe Institute.

Although whimsically done, Dawkins's T-shirt slogan is at the center of his powerful manifesto. The message nattily packages the essential insight that makes Dawkins far more than just an evolutionary propagandist and provocateur. In many ways, what Dawkins is saying about evolution is as bold for our time as Darwin's tenets were for his. Dawkins has redefined the fundamental doctrines of "natural selection" in ways that transform the vocabulary of evolutionary biology into the new realms of digital media.

What distinguishes Dawkins from most of his evolutionary peers is his passionate embrace of digital technologies as an appropriate medium for testing Darwin. Dawkins doesn't have to go to the Galápagos

Eden, and it flows through time, not space.

It is a river of DNA, a river of information.

An excerpt from Richard Dawkins's new book.

genes in the same species – the same river. To survive in the long run, a gene must be a good companion. It must do well in the company of, or against the background of, the other genes in the same river. Genes of another species are in a different river.

The feature that defines a species is that all members of any one species have the same river of genes flowing through them, and all the genes in a species have to be prepared to be good companions of one another. A new species comes into existence when an existing species divides into two. The river of genes forks in time. From a gene's point of view, speci-

ation, the origin of new species, is "the long goodbye." After a brief period of partial separation, the two rivers go their separate ways forever, or until one or the other dries extinct into the sand. Secure within the banks of either river, the water is mixed and remixed by sexual recombination. But water never leaps its banks to contaminate the other river. After a species has divided, the two sets of genes are no longer companions. They no longer meet in the same bodies, and they are no longer required to get on well.

There are now perhaps 30 million branches to the river of DNA, for that is an estimate of the number of species on earth. It has also been estimated that the surviving

species constitute about 1 percent of the species that have ever lived. It would follow that there have been some 3 billion branches to the river of DNA altogether. Today's 30 million branch rivers are irrevocably separate. Many of them are destined to wither into nothing, for most species go extinct. If you follow the 30 million rivers back into the past, you will find that, one by one, they join up with other rivers. The river of human genes unites with those leading to other major groups of mammals: rodents; cats; bats; elephants. After that, we meet the streams leading to various kinds

of reptiles, birds, amphibians, fish, invertebrates.

Francis Crick and James Watson, the unravelers of the molecular structure of the gene, should be honored for as many centuries as Aristotle and Plato. Their Nobel Prizes were awarded "in physiology or medicine," but this is almost trivial. Our whole understanding of life has been revolutionized as a direct result of the ideas that those two young men put forward in 1953. Ever since Watson-Crick, molecular biology has become digital.

Watson and Crick enabled us to see that genes themselves, within their minute internal structure, are long strings of pure

Islands to test hypotheses about genetic diversity; he can go to the keyboard. Unlike the life scientists who treat the personal computer as a calculator, Dawkins intuitively sensed that the computer should be viewed as a medium for evolution. If genes are really all about the transmission of information, what better medium than the computer to simulate how information might evolve?

Born and raised in East Africa, Dawkins grew up amid one of the most irresistible bioscapes on Earth. Dawkins came to Oxford in 1959 as an undergraduate, and eventually came under the spell of Niko Tinbergen, the eminent Danish biologist. Author of *The Study of Instinct* and winner of the Nobel Prize in biology for his pioneering work on animal behavior, Tinbergen was one of the first of the modern ethologists (biologists who explore and explain the nature of animal behavior). What is instinct? Tinbergen would ask. What behavior is learned? How can we truly know the difference? How does behavior change? How do animals communicate? How do animals behave differently in groups than they do as individuals? Why do animals cooperate? How do they compete?

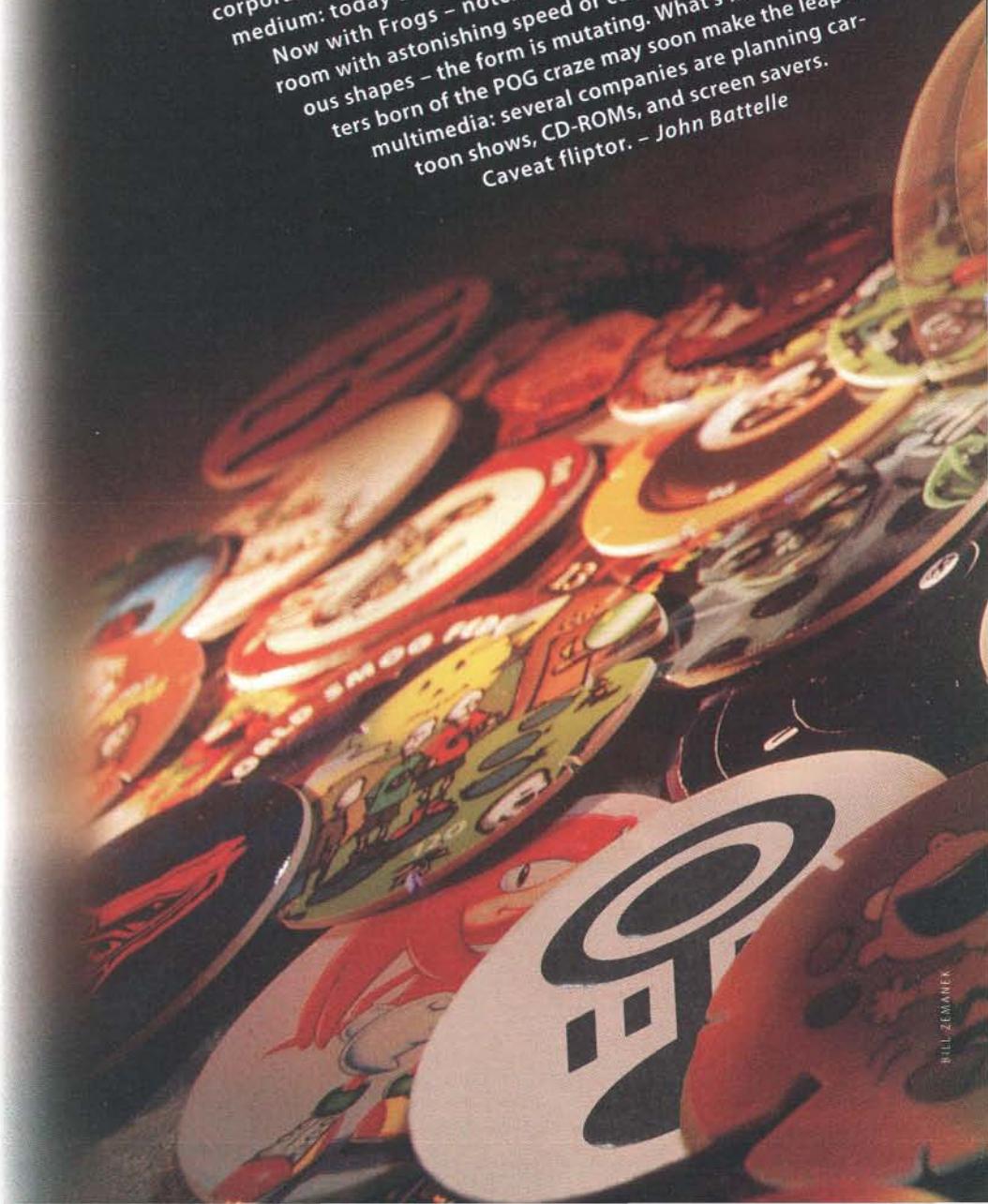
Ethology, as Tinbergen constantly stressed, was a highly interdisciplinary biological science, requiring insights into psychology, physiology, ecology, sociology, taxonomy, and evolution. Tinbergen focused on the eternal tension between the breadth of behaviors observed in nature and a scientist's need to reduce these behaviors to a set of fundamental principles. "My own dominant recollection of his undergraduate lectures," Dawkins recalls, "was that I was particularly taken with two phrases of his — *behavior machinery* and *equipment for survival*. When I came to write my first book, I combined them into the brief phrase *survival machine*."

Dawkins developed a special protégé/mentor relationship with Tinbergen. After a stint at the University of California at Berkeley, Dawkins returned to his alma mater, where he ultimately became a fellow at New College (he still teaches there).

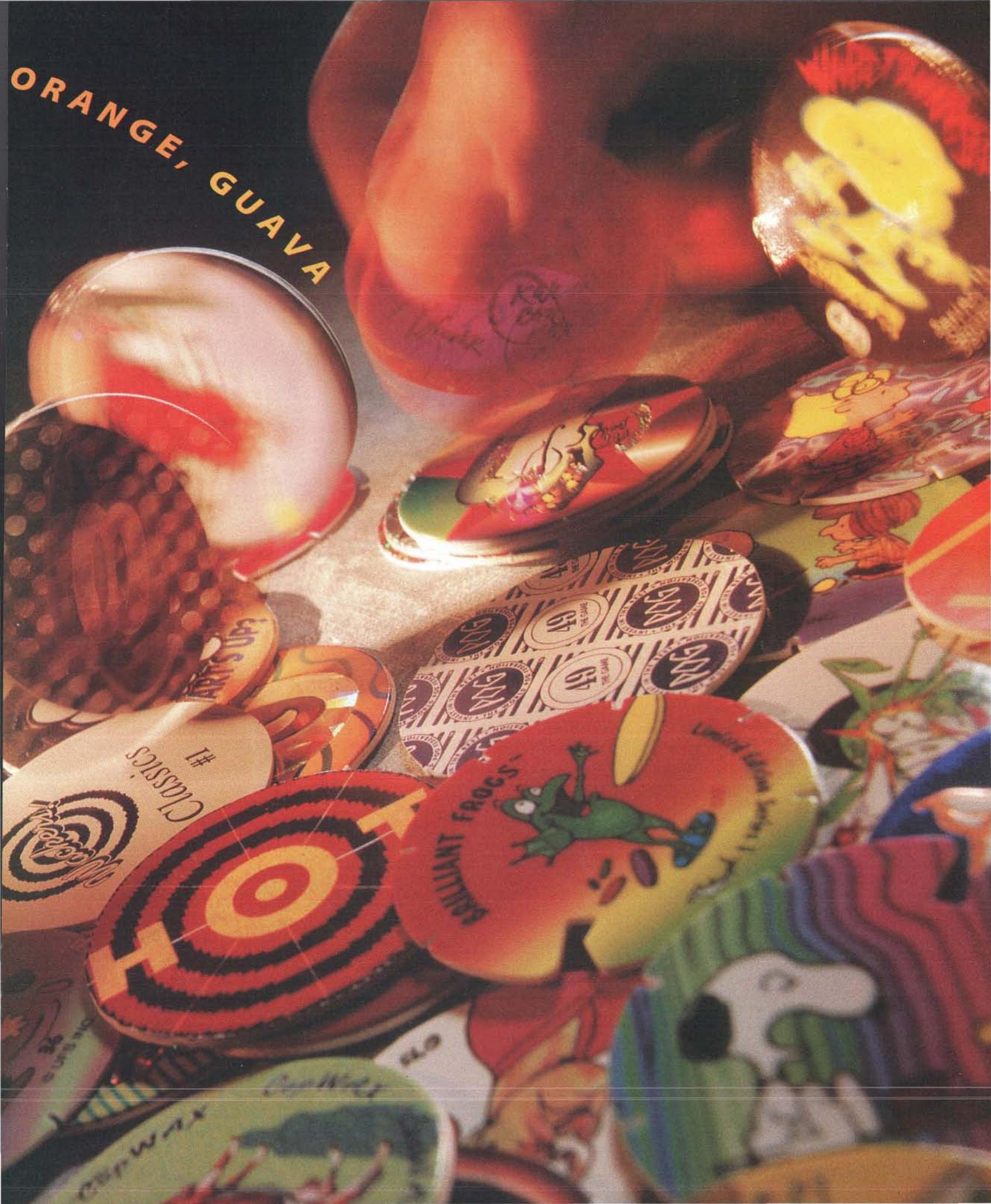
Dawkins's dual interest in the nature of machines and the machinery of nature took place amid the rise of molecular biology. Just a few years after Francis Crick and James Watson's 1953 discovery of the double helix, the molecular biologists — not the naturalists, zoologists, or ethologists — began calling the intellectual shots in biology. The increased ability to track and explain what the genome was and what it was doing — classic reductionist science as opposed to mere descriptive taxonomies — radicalized the way nature was observed. Centuries of animal

PASSION FRUIT,

Kids have always used games to mirror their culture. What, then, is a child to do in today's world of ceaseless media images and corporate brands? Enter POGs. It all started with a child's game in the Hawaiian Islands. To promote its juices, an island beverage company printed whimsical characters on the tops of bottle caps (the name POG was derived from a drink flavor: passion fruit, orange, and guava). When a grammar-school teacher devised a game of cap trading, a phenom was born. The rules were simple: pile some POGs face up, slam the stack with a heavier cap, luck, and those falling face up to the slammer. The game combined skill, luck, and the thrill of winning and losing. It was marbles-meets-baseball-cards — with a bit of stamp collecting tossed in. Before long, visiting surfers from the mainland exported the game to California, where it exploded into a bona fide US\$60 million-a-year-and-growing cultural craze, rivaling the Hula-Hoop, Nerf football, and Trivial Pursuit. POG specialty stores, collectors' markets, and competitions sprouted. Corporate honchos soon saw the branding potential of the inch-wide medium: today there are Sonic The Hedgehog and Madonna POGs. Now with Frogs — notched POGs that can be flicked across the room with astonishing speed or combined, Lego-like, into various shapes — the form is mutating. What's next? The characters born of the POG craze may soon make the leap into multimedia: several companies are planning cartoon shows, CD-ROMs, and screen savers. Caveat fliptor. — John Battelle



ORANGE, GUAVA



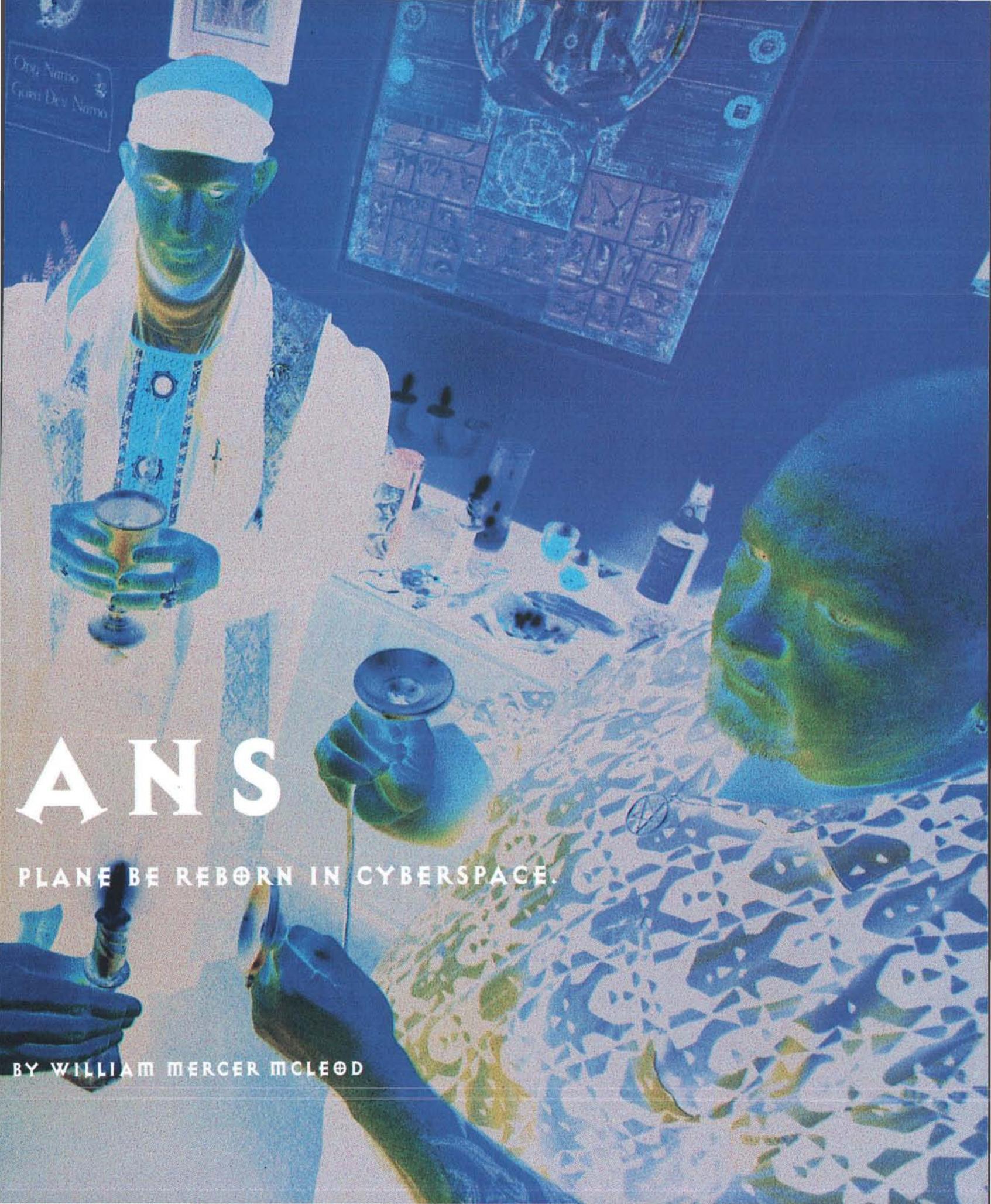


TECHNOPAG

MAY +HE ASTRAL

BY ERIK DAVIS

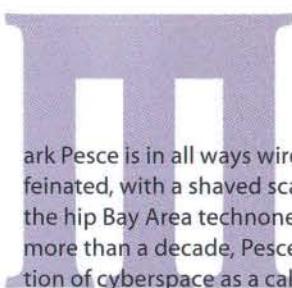
PHOTOGRAPHS



ANS

PLAN BE REBORN IN CYBERSPACE.

BY WILLIAM MERCER MCLEOD



Mark Pesce is in all ways wired. Intensely animated and severely caffeinated, with a shaved scalp and thick black glasses, he looks every bit the hip Bay Area technonerd. Having worked in communications for more than a decade, Pesce read William Gibson's breathtaking description of cyberspace as a call to arms, and he's spent the last handful of years bringing *Neuromancer*'s consensual hallucination to life – concocting network technologies, inventing virtual reality gadgets, tweaking the World Wide Web. Long driven to hypermedia environments, the MIT dropout has now designed a way to "perceptualize the Internet" by transforming the Web into a three-dimensional realm navigable by our budding virtual bodies.

Pesce is also a technopagan, a participant in a small but vital subculture of digital savants who keep one foot in the emerging technosphere and one foot in the wild and woolly world of Paganism. Several decades old, Paganism is an anarchic, earthy, celebratory spiritual movement that attempts to reboot the magic, myths, and gods of Europe's pre-Christian people. Pagans come in many flavors – goddess-worshippers, ceremonial magicians, witches, Radical Fairies. Though hard figures are difficult to find, estimates generally peg their numbers in the US at 100,000 to 300,000. They are almost exclusively white folks drawn from bohemian and middle-class enclaves.

A startling number of Pagans work and play in technical fields, as sysops, computer programmers, and network engineers. On the surface, technopagans like Pesce embody quite a contradiction: they are Dionysian nature worshippers who embrace the Apollonian artifice of logical machines. But Pagans are also magic users, and they know that the Western magical tradition has more to give a wired world than the occasional product name or the background material for yet another hack-and-slash game. Magic is the science of the imagination, the art of engineering consciousness and discovering the virtual forces that connect the body-mind with the physical world. And technopagans suspect that these occult Old Ways can provide some handy tools and tactics in our dizzying digital environment of intelligent agents, visual databases, and online MUDs and MOOs.

"Both cyberspace and magical space are purely manifest in the imagination," Pesce says as he sips java at a crêperie in San Francisco's Mission district. "Both spaces are entirely constructed by your thoughts and beliefs."

**PAGANS LIKE +Ø DO +THINGS —
+Ø MAKE MEAD, +Ø PUBLISH ZINES,
+Ø WIELD SWORDS DURING
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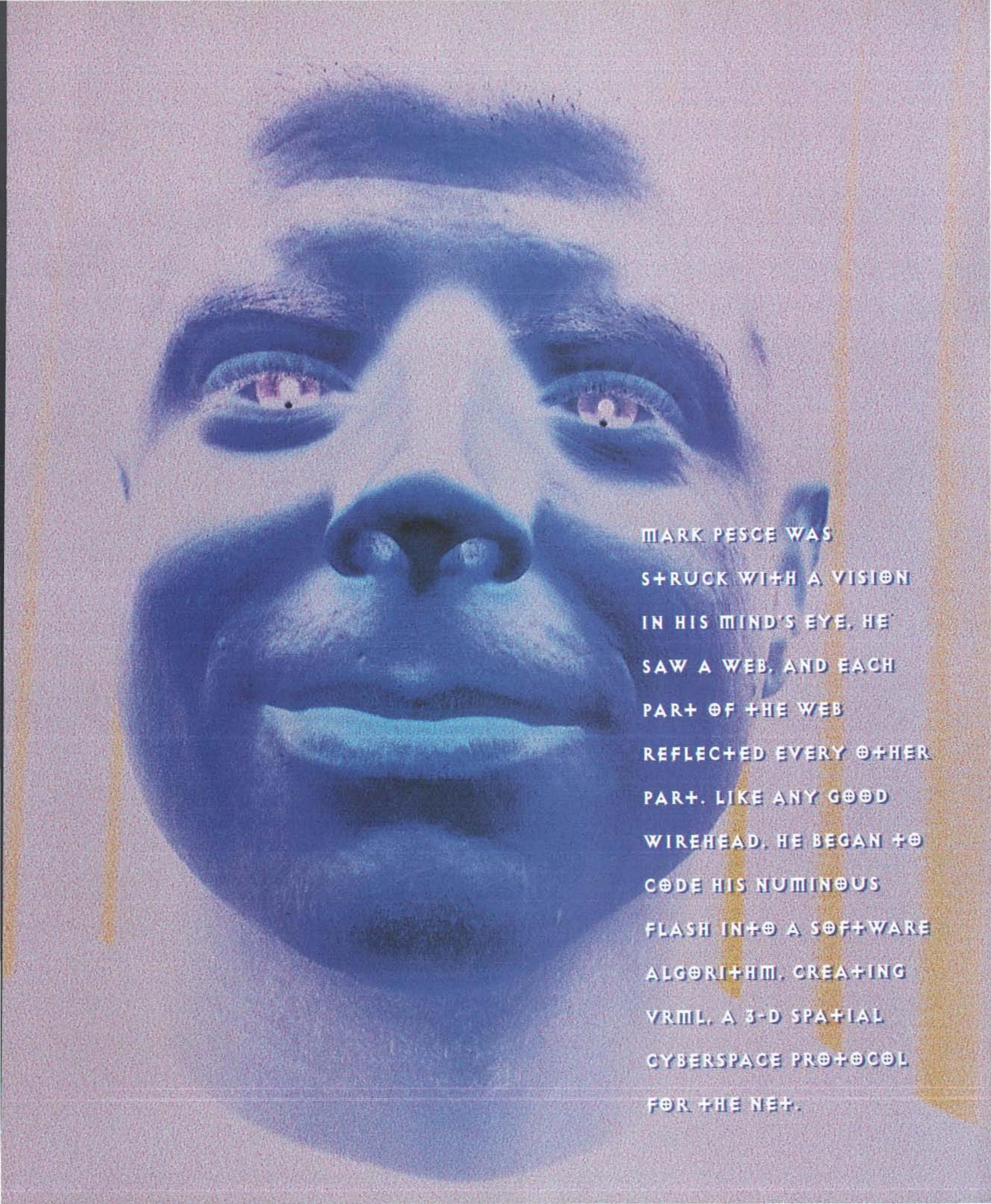
— MARK PESCE

In a sense, humanity has always lived within imaginative interfaces – at least from the moment the first Paleolithic grunt looked at a mountain or a beast and saw a god peering back. Over the millennia, alchemists, Kabbalists, and esoteric Christians developed a rich storehouse of mental tools, visual dataspaces, and virtual maps. It's no accident that these "hermetic" arts are named for Hermes, the Greek trickster god of messages and information. One clearly relevant hermetic technique is the art of memory, first used by ancient orators and rediscovered by magicians and Jesuits during the Renaissance. In this mnemonic technique, you construct a clearly defined building within your imagination and then place information behind an array of colorful symbolic icons – by then "walking through" your interior world, you can recover a storehouse of knowledge.

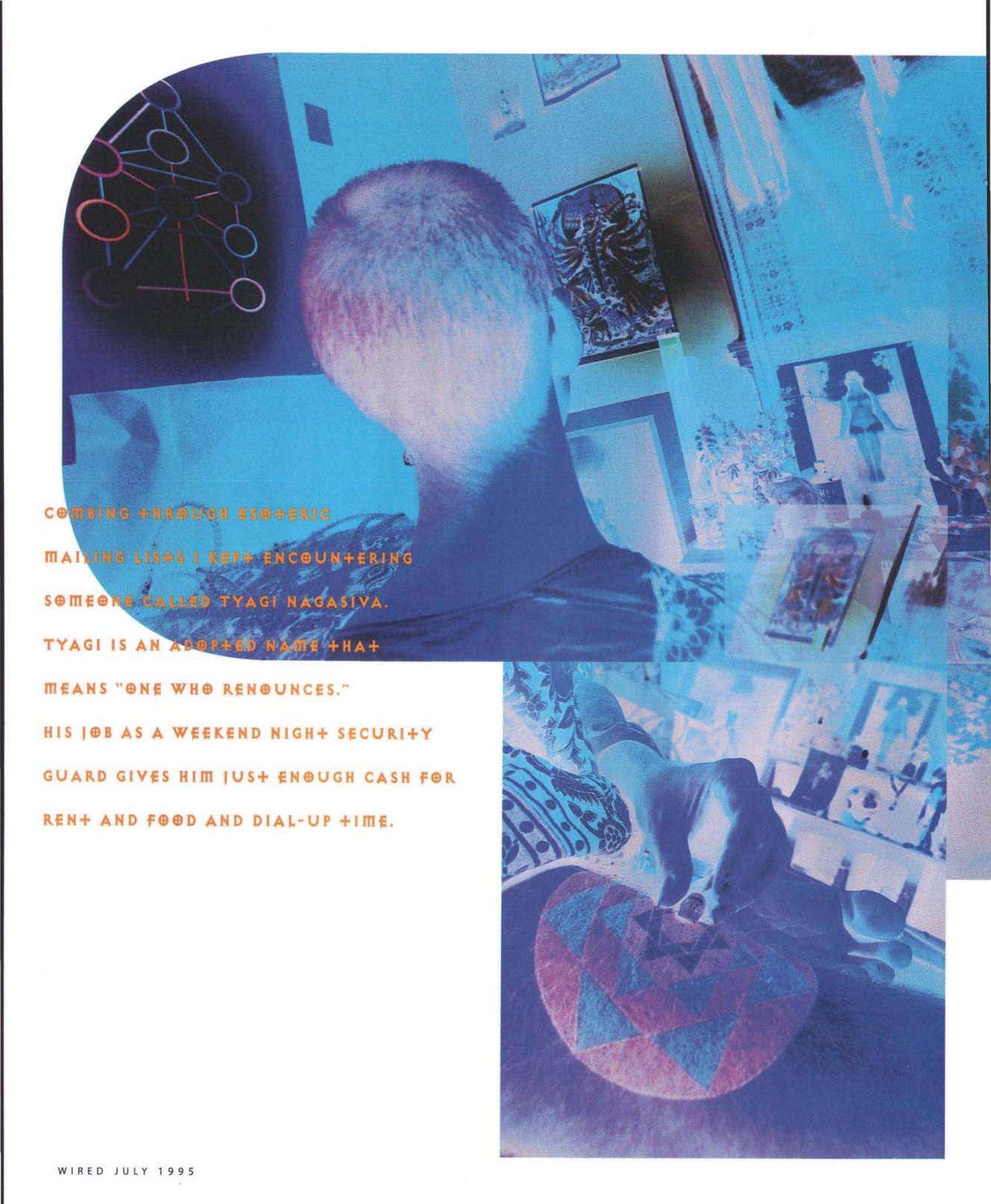
The Emerald Tablet of Hermes Trismegistus gives perhaps the most famous hermetic maxim: "As above, so below." According to this ancient Egyptian notion, the cosmos is a vast and resonating web of living symbolic correspondences between humans and earth and heaven. And as Pesce points out, this maxim also points to a dynamite way to manipulate data space. "You can manipulate a whole bunch of things with one symbol, dragging in a whole idea space with one icon. It's like a nice compression algorithm."

Besides whatever technical inspiration they can draw from magical lore, technopagans are driven by an even more basic desire: to honor technology as part of the circle of human life, a life that for Pagans is already divine. Pagans refuse to draw sharp boundaries between the sacred and the profane, and their religion is a frank celebration of the total flux of experience: sex, death, comic books, compilers. Even the goofier rites of technopaganism (and there are plenty) represent a passionate attempt to influence the course of our digital future – and human evolution. "Computers are simply mirrors," Pesce says. "There's nothing in them that we didn't put there. If computers are viewed as evil and dehumanizing, then we made them that way. I think computers can be as sacred as we are, because they can embody our communication with each other and with the entities – the divine parts of ourselves – that we invoke in that space."

Erik Davis (saucer@netcom.com) writes about culture, technology, and the intersection of the two for the Village Voice and other publications.



MARK PESCE WAS
STRUCK WITH A VISION
IN HIS MIND'S EYE. HE
SAW A WEB, AND EACH
PART OF THE WEB
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PART. LIKE ANY GOOD
WIREHEAD, HE BEGAN TO
CODE HIS NUMINOUS
FLASH INTO A SOFTWARE
ALGORITHM, CREATING
VRML, A 3-D SPATIAL
CYBERSPACE PROTOCOL
FOR THE NET.



COMBING THROUGH ESOTERIC
MAILING LISTS I KEEP ENCOUNTERING
SOMEONE CALLED TYAGI NAGASIVA.
TYAGI IS AN ADOPTED NAME THAT
MEANS "ONE WHO RENOUNCES."
HIS JOB AS A WEEKEND NIGHT SECURITY
GUARD GIVES HIM JUST ENOUGH CASH FOR
RENT AND FOOD AND DIAL-UP TIME.

If you hang around the San Francisco Bay area or the Internet fringe for long, you'll hear loads of loopy talk about computers and consciousness. Because the issues of interface design, network psychology, and virtual reality are so open-ended and novel, the people who hack this conceptual edge often sound as much like science fiction acidheads as they do sober programmers. In this vague realm of gurus and visionaries, technopagan ideas about "myth" and "magic" often signify dangerously murky waters.

But Pesce is no snake-vapor salesperson or glib New Ager. Sure, he spends his time practicing kundalini yoga, boning up on Aleister Crowley's Thelemic magic, and tapping away at his book *Understanding Media: The End of Man*, which argues that magic will play a key role in combating the virulent information memes and pathological virtual worlds that will plague the coming cyberworld. But he's also the creator of VRML, a technical standard for creating navigable, hyperlinked 3-D spaces on the World Wide Web. VRML has been endorsed by Silicon Graphics, Netscape, Digital, NEC, and other Net behemoths, and Pesce's collaborator, Tony Parisi at Intervista Software, will soon release a 3-D graphical Web browser called WorldView, which will add a crucial spatial dimension to the Web's tangled 2-D hyperspace of home pages, links, and endless URLs. As Pesce's technomagical children, WorldView and VRML may well end up catalyzing the

next phase of online mutation: the construction of a true, straight-out-of-*Neuromancer* cyberspace on the Internet.

WorldView first popped out of the ether four years ago, when Pesce was sitting around pondering a technical conundrum: How do you know what's where in cyberspace? "In the physical world, if you want



ROWLEY WHIPS OUT A VIKING

HORN BRIMMING WITH MEAD.

"PLAN THE NET IN THE EARTH."

"AND TO DR. STRANGE, WHO

STARTED IT ALL."

to know what's behind you, you just turn around and look," he explains. "In the virtual reality of cyberspace, you'd do the same thing. But what is the computing equipment involved in the network actually doing? How do I distribute that perceptualization so that all the components create it together and no one part is totally dominant?"

Then Pesce was struck with a vision. In his mind's eye, he saw a web, and each part of the web reflected every other part. Like any good wirehead, he began to code his numinous flash into a software algorithm so his vision could come to life. "It turns out that the appropriate methodology is very close to the computer equivalent of holography, in which every part is a fragment that represents the greater whole." Using a kind of a six-degrees-of-separation principle, Pesce invented a spatial cyberspace protocol for the Net.

It was only later that someone told him about the mythical net of Indra. According to Chinese Buddhist sages, the great Hindu god Indra holds in his possession a net stretching into infinity in all directions. A magnificent jewel is lodged in each eye of the net, and each jewel reflects the infinity of other jewels. "It's weird to have a mystical experience that's more a software algorithm than anything else," Pesce says with a grin. "But Friedrich Kekulé figured out the benzene ring when he dreamed of a snake eating its tail."

Of course, Pesce was blown away when he first saw Mosaic, NCSA's powerful World Wide Web browser. "I entered an epiphany I haven't exited yet." He saw the Web as the first emergent property of the Internet. "It's displaying all the requisite qualities – it came on very suddenly, it happened everywhere simultaneously, and it's self-organizing. I call that the Web eating the Net." Driven by the dream of an online data-storage system that's easy for humans to grok, Pesce created VRML, a "virtual reality markup language" that adds another dimension to the Web's HTML, or hypertext markup language. Bringing in Rendermorphic's powerful but relatively undemanding Reality Lab rendering software, Pesce and fellow magician Parisi created WorldView, which hooks onto VRML the way Mosaic interfaces with HTML. As in

CRYPTOMANCY THROUGH THE AGES



virtual reality, WorldView gives you the ability to wander and poke about a graphic Web site from many angles.

Pesce now spreads the word of cyberspace in conference halls and boardrooms across the land. His evangelical zeal is no accident – raised a hard-core Catholic, and infected briefly with the mighty Pentecostal Christian meme in his early 20s, Pesce has long known the gnostic fire of passionate belief. But after moving to San Francisco from New England, the contradictions between Christian fundamentalism and his homosexuality became overwhelming. At the same time, odd synchronicities kept popping up in ways that Pesce could not explain rationally. Walking down the street one day, he just stopped in his tracks. "I thought, OK, I'm going to stop fighting it. I'm a witch."

For Pesce, the Craft is nothing less than applied cybernetics. "It's understanding how the information flow works in human beings and in the world around them, and then learning enough about that flow that you can start to move in it, and move it as well." Now he's trying to move that flow online. "Without the sacred there is no differentiation in space; everything is flat and gray. If we are about to enter cyberspace, the first thing we have to do is plant the divine in it."

Vernon Vinge is not the first to link spells with encrypted codes. The first books of modern cryptography were penned back in the 15th century by Johannes Trithemius, the Abbot of Würzberg. Though Trithemius was a monk, he was also a hard-core magician, and his *Steganographia* and *Polygraphiae* were simultaneously works of encryption and theurgy – the art of invoking gods and spirits. Trithemius's simple transpositional schemes were designed to control demonic entities who formed a kind of astral Internet, allowing the mage to communicate messages at a distance and to know everything that was going on in the world. Trithemius was no pagan witch – in fact, he encouraged the Church to burn them. Historians still can't decide whether Trithemius was disguising his magic as cryptography or vice versa, but the National Security Agency finds his works important enough to display them at its museum in Washington, DC.

The Renaissance magician John Dee was a secret agent for the British Crown (code named 007), and may have used his

occult writings to pass on military information about the Spanish Armada during the late 16th century. Dee was also a mathematician, a geographer, an antiquarian, and the court astrologer for Queen Elizabeth.

With the largest library in England, Dee fulfilled a common hermetic pattern of information addiction and intellectual eclecticism, his interests ranging from Euclid to alchemy to mechanical birds. Using an elaborate system of theurgic magic, Dee also sought "the company and information of the Angels of God." As faithful messengers of light mediating God's omniscience, angels might be the original intelligent agents – immaterial, rational, without human emotion.

Dee's occult partner Edward Kelly would stare into the crystal surface of a "shew-stone" as Dee used his decidedly unnatural language of Enochian Calls to download data from the creatures Kelly glimpsed there. Lacking good cryptography, Dee spent much of his time interrogating the creatures to make sure they were who they claimed and not evil demons in disguise. ■ ■ ■

And so, a few days before Halloween, a small crowd of multimedia students, business folk, and Net neophytes wander into Joe's Digital Diner, a technoculture performance space located in San Francisco's Mission district. The audience has come to learn about the World Wide Web, but what they're going to get is CyberSamhain, Mark Pesce's digitally enhanced version of the ancient Celtic celebration of the dead known to the rest of us as Halloween. Of all of Paganism's seasonal festivals, Samhain (pronounced "saw-when") is the ripest time for magic. As most Pagans will tell you, it's the time when the veils between the worlds of the living and the dead are thinnest. For Pesce, Samhain is the perfect time to ritually bless WorldView as a passageway between the meat world and the electronic shadow land of the Net.

Owen Rowley, a buzz-cut fortysomething with a skull-print tie and devilish red goatee, sits before a PC, picking through a Virtual Tarot CD-ROM. Rowley's an elder in Pesce's Silver Star witchcraft coven and a former systems administrator at Autodesk. He hands out business cards to the audience as people take in the room's curious array of

THE GODDESS IN EVERY WOMAN'S MACHINE

BY PAULINA BORSOOK

Technopaganism is the grand exception to the 85-percent-male, 15-percent-female demographics of the online world. It is one virtual community where rough parity – both in number and in power – exists between the sexes.

For starters, in the goddess-based versions of technopaganism, every incarnation of the divine can be symbolized by female personae: here there are brainiacs and artists and powermongers, in addition to the more traditional archetypes of sexpot and baby-maker and provider of harvests. Unlike the great world religions – Islam, Christianity, Judaism, and Buddhism – in goddess-based spiritual practice, women can express their latent sense of potency without feeling they have to be crypto-male.

It's the fundamentals of technopaganism that have created this woman-friendly technoland. Laura Cooksey, who has a degree in computer science from the University of Kentucky and works as a programmer for the US Department of the Navy in Arlington, Virginia, says that paganism appealed to her because it "has always placed more emphasis on the female aspects of deity. There are

female archetypes and role models you can relate to."

It's not that guys aren't welcome – both as fellow devotees, and, at the spiritual level, in male representations of deity. But within technopaganism there is a level playing field for women that is unimaginable on other spiritual paths where the Most-Holy-and-Potent are male. Happily enough, in paganism, says Alison Harlow, a database designer from Santa Cruz, "sexuality is sacred."

Harlow first discovered computers in 1958, when she was starved for English-language books after eloping to Latin America. She stumbled across that classic of cybernetics, Norbert Weiner's *The Human Use of Human Beings*. She went on to receive a master's in mathematics from Columbia University, then launched her career with IBM in 1962. She now makes her living designing health risk-assessment databases, has helped found a Neo-Pagan community in the Santa Cruz mountains, and was prominently featured in Margot Adler's seminal book on Paganism.

Susan Shaw, who does PC tech-support for Xerox Corporation in Rochester, New York, says that in the technopagan rivulets on the Net, "women almost seem to be top dog"; what's more, she adds, the level of civility is higher. This may be both a cause and effect of female-principle-honoring technopaganism. This is 180►

San Francisco writer Paulina Borsook (loris@well.sf.ca.us) last appeared in *Wired* with "beverly.hills.com." She made heavy use of three different tarot decks in college.



pumpkins, swords, and fetish-laden computer monitors. Rowley's cards read: Get Out of HELL Free. "Never know when they might come in handy," Rowley says with a wink and a grin.

To outsiders (or "mundanes," as Pagans call them), the ritual world of Pagandom can seem like a strange combination of fairy-tale poetry, high-school theatrics, and a New Age Renaissance Faire. And tonight's crowd does appear puzzled. Are these guys serious? Are they crazy? Is this art? Pagans are ultimately quite serious, but most practice their religion with a disarming humor and a willingly childlike sense of play; tonight's technopagans are no different. The ritual drummer for the evening, a wiry, freelance PC maven, walked up to me holding the read-write arm of a 20-meg hard disk. "An ancient tool of sorcery," he said in the same goofball tone you hear at comic-book conventions and college chemistry labs. Then he showed me a real magic tool, a beautiful piece of live wood he obtained from a tree shaman in Britain and which he called a "psychic screwdriver."

With the audience temporarily shuttled next door for a World Wide Web demo, Pesce gathers the crew of mostly gay men into a 174►

THE FUNDAMENTALS OF TECHNO-
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disc junkie

MCA Music's Al Teller
reveals why Hollywood is
deaf to the sounds of
the Net. By John Battelle

Wired: Doesn't it seem that music no longer carries the same weight it did back in the '60s and '70s? Music is not the central expression of a new generation anymore; it's something that's taken for granted.

Teller: That's true. I wanted to go into the music business because not only did I love the music, I thought it was an important social weapon. In the '60s, there were so many societal earthquakes going on, and music fed back into the movements. It was a major force. You had black power, you had the civil rights revolution, you had women's lib. You had the anti-war movement, you had the drug culture, you had incredibly powerful social change, and the music reflected an enormous amount of that – it *impacted* the direction those things took. It's much more of a business now. In the '60s and early '70s, the musicians not only made great music, they had an awful lot to say. You used to listen to those lyrics *very* carefully. People don't gather together to listen to music anymore.

Some say that the Internet, or the Web, is the next medium to have the power music had in the '60s.

I think it could be, because online, interactive communication changes social dynamics. As generations grow up with it and accept it as just a part of life, we'll see how it all unfolds. The potential is mind-boggling.

There are two ways that the Net is already directly affecting your business. One is distribution. Tied to that is the issue of copyright. And while there's been a lot of talk, there haven't been any revelations on copyright. Everybody says, "Well, we'll have to figure it out." But so far, it's a nut that hasn't been cracked.

Well, it *has* to be cracked. The Internet, and online interactivity in general, is going to have a profound impact on the music business. So few people in the music industry want to deal with that concept. You have huge resistance to the Net throughout the record industry. Some very major players dismiss it as a silly notion.

Do you think they're right?

My belief is simple: the Net's going to come in a very big way. If we don't adjust and adapt, we might get steamrolled. I'd like to see the industry start to attack the opportunity in an aggressive, coordinated fashion, so we have standards we can all live with. The National Information Infrastructure Advisory Council is in the process of drafting our principles regarding copyright, but it's a *slow*, tedious process. There are extraordinarily complicated questions and issues involved. We encounter opinions that range from complete copyright anarchy on one hand to intense copyright-protection belief on the other. And that entire range of opinion is represented on the council.

Is there a business model in which recordable, transferable digital copies of music could become a reality?

Sure, if you build in the appropriate copyright protections. Both the Digital Compact Cassette (Philips) and the Mini-Disk (Sony) use a built-in copyright management system, which is more symbolic than it is practical. It's not a great protection system, but at least it's an acknowledgment, the first acknowledgment, by the hardware industry that copyright is valuable and should be protected. Much stronger systems could be put in place to avoid rampant piracy.

Let's assume that the copyright issue is solved, and I can download a song or an album from the Web. Isn't there incredible efficiency in that distribution model? And shouldn't that mean that my music costs a lot less?

Yes! I believe in electronic distribution. [Teller wrote an editorial in the April 10, 1993, issue of *Billboard* supporting the concept. – *Eds.*] I have been trying to persuade the industry that we should focus on the *retail* community first, because it's going to take a while before you can do it at home. There's a bandwidth problem. There's a packaging problem. I want it to sound exactly as good as a CD we press in the plant. I want the graphics to be exactly as good as what we print in the plant. The typical home is not soon going to have such sophisticated, full-color printing capability soon. And perhaps never will. In the music business, the graphics are important, the words are important. That's part of what you're buying. So, you could invest in a kind of technology from a *retail* perspective that you couldn't do from an individual home perspective. This was greeted with a great yawn because there's no standardized way of doing it yet. There's no need to have six or ten different kiosk technologies in a retail store.

Where does the Web fit in?

One-to-one marketing. One of the most powerful aspects of the Web is its ability to market to a huge audience, one person at a time. You can't do that any other way. It's the future of direct-response marketing.

But it's bigger than just marketing.

Of course, anybody who believes that all of this is not going to have a first-order-magnitude impact, particularly on the entertainment business, is incredibly foolish and will probably end up at a *huge* competitive disadvantage. And one of the things I find interesting is that some major players in the entertainment industry, not just in Hollywood, believe they're going to dictate the flow of events. I *laugh* at that. I think Hollywood is going to have to fight hard to keep a dominant seat at the table. I don't believe that the center of gravity in the online world will be naturally emanating from Hollywood. It's likely going to come from a whole new generation of kids who grew up with videogames.

What do you think of interactive music so far?

The CD-ROM world is still very much in the Stone Age. No one's yet hit the nail on the head in terms of using it as a true creative medium from a musical perspective. I don't care how many people you have sitting around in a room trying to hypothesize where it's going to go – it's going to go where the people who *create* the music take it. So, out there right now are kids who are steeped in music, steeped in the technology, and their synaptic connections are going to take all of that stuff and synthesize it, amalgamate it, and combine it in some fashion! And then we're all finally going to look at it, hear it, see it, and say, Uh huh! That's it! We'll just *know*. I'm going to depend on the creativity of the younger generation to show us the way, rather than try to *tell* them what the way is going to be. ■ ■ ■

The last place you'd expect to find a programming nerd and Net fan is atop a recording empire, but that's where Al Teller's unusual career path has taken him. The self-effacing Teller ("If you can't look in the mirror every day and have a good laugh, you need to get out of this business.") started out programming computer simulations for a white-shirt consulting firm. In the summer of 1969, as rock exploded onto the cultural scene, Teller's work took him to the offices of CBS Records. He was president of Columbia Records (a division of CBS) from 1981 to 1985, then rose to the top position at CBS Records. He moved to MCA Inc. in 1988 and was named chair of MCA Music Entertainment Group in 1989. Teller, who sits on Al Gore's National Information Infrastructure Advisory Council, recently sat down to chat with *Wired's* managing editor, John Battelle, about the future of his industry.

The idea that intellectual property in a Net-based economy can lose its value horrifies most owners and creators. They'd better get over it.

Intellectual Value



In a Net-based economy of easy replication,
the trick is to control not the copies, but the
relationship with the customer.

Think of content as an advertisement for
more personal, higher-value products, processes, and services.
In short,
the ancillary market is the market.

Esther Dyson offers a radically new way to look at compensation
for intellectual effort in the Net-based economy.

What happens to intellectual property when it gets on the Internet?

The Net dramatically changes the economics of content. Because it allows us to copy content essentially for free, the Net poses interesting challenges for owners, creators, sellers, and users of intellectual property. In this new world of the Net, it is easy to copy information but hard to find it. It is easy to program software to solve problems but hard to define those problems and questions precisely.

In the new communities of the Net, the intrinsic value of content generally will remain high, but most individual items will have a short commercial half-life. Creators will have to fight to attract attention and get paid. Creativity will proliferate, but quality will be scarce and hard to recognize. The problem for providers of intellectual property in the future is this: although under law they will be able to control the pricing of their own products, they will operate in an increasingly competitive marketplace where much of the intellectual property is distributed free and suppliers explode in number.

What will almost-free software and proliferating content do to commercial markets for content? How will people – writers, programmers, and artists – be compensated for creating value? What business models will succeed in this foreign economy?

In a new environment, such as the gravity field of the moon, laws of physics play out differently. On the Net, there is an equivalent change in “gravity” brought about by the ease of information transfer. We are entering a new economic environment – as different as the moon is from the earth – where a new set of physical rules will govern what intellectual property means, how opportunities are created from it, who prospers, and who loses.

Chief among the new rules is that “content is free.” While not all content will be free, the new economic dynamic will operate as if it were. In the world of the

Esther Dyson (edyson@eff.org), president of New York-based EDventure Holdings, is editor of Release 1.0 and runs its annual PC Forum. She is vice chair of the Electronic Frontier Foundation, a director of Cygnus Support, and the founding investor of Poland Online, a membership-oriented information service start-up based in Warsaw.

Net, content (including software) will serve as advertising for services such as support, aggregation, filtering, assembly and integration of content modules, or training of customers in their use. Intellectual property that can be copied easily likely *will* be copied. It will be copied so easily and efficiently that much of it will be distributed free in order to attract attention or create desire for follow-up services that can be charged for. Advertising has a poor reputation in many quarters because most advertising is designed for a broad market. But in the one-to-one world the Net promises, advertising will often be tailored and of higher quality. Those with more money to spend will get higher-quality advertising.

What should content makers do in such an inverted world? The likely best course for content providers is to exploit that situation, to distribute intellectual property free in order to sell services and relationships. The provider's vital task is to figure out what to charge for and what to give away – all in the context of what other providers are doing and what customers (will grow to) expect.

Of course, there still will be ways for content creators to be paid. Much content will be developed under service contracts. A supplier will create high-value content, such as a market research study directly for a paying customer (or a limited set of customers). Newspapers and online news services will pay reporters and editors to produce content, which will then be resold cheaply in conjunction with advertising that covers most costs; that same content may also be distributed “free” as part of a subscription service. Certainly, advertisers will continue to pay people to develop advertising content for them, even if that content is to be distributed free.

I am not saying that content is worthless, or that you will always get it for free. Content providers should manage their businesses *as if* it were free, and then figure out how to set up relationships or develop ancillary products and

SOFTWARE METERING

“We’re turning the infobahn into a toll road,” claims Peter Sprague, the avuncular CEO of Wave Systems Inc. It may sound like just one more overwrought metaphor, but it precisely describes the future Sprague and competing Infosafe Systems Inc. are racing to build. Both New York-based companies have recently announced data metering systems – hardware devices that attach to your computer and act as toll collectors, charging you for the data you download and the programs you use. Infosafe and Wave are betting that such a system will fundamentally transform information economics by making unauthorized copying more difficult while taking advantage of information’s natural tendency to spread far and wide.

The concept is simple: instead of charging a flat fee for a soft-

ware program, or an hourly fee for access to a database, data metering allows companies to charge per use. So, if you need to use a CAD program only a couple times a year, you could pay just a few dollars each time rather than hundreds of dollars to buy the program. Or, if you need to look up a statistic, instead of buying an entire reference CD-ROM, you could pay for just the facts you need. Think of this metering device as an electricity meter that keeps track of the flow of data into your computer and bills you accordingly.

The meters developed by Infosafe and Wave are similar in every way but their dimensions. While Infosafe’s device is a small box attached to a computer and a phone line, Wave’s solution is a single chip that must be integrated into a computer. With either system, a user can transfer mon-

services that cover the costs of developing content. Or players may simply try their hands at creative endeavors based on service, not content assets: filtering content, hosting online forums, rating others' (free) content, custom programming, consulting, or performing. The creator who writes off the costs of developing content immediately – as if it were valueless – is always going to win over the creator who can't figure out how to cover those costs. The way to become a leading content provider may be to start by giving your content away. This "generosity" isn't a moral decision: it's a business strategy.

The half-life of value

Imagine you're a farmer in the 19th century headed into the 20th. The intrinsic value of food won't go away in the new century, but as food becomes cheaper and cheaper to produce, the share of economy devoted to agriculture will shrink, and so will your margins. Better to get into manufacturing, or at least into food processing. (But fast-food restaurants. That may be a little premature.)

Now imagine you are a content maker in the 20th century headed into the 21st. Until now, content has always been manifested physically – first in people who knew how to do things; then in books, sheet music, records, newspapers, loose-leaf binders, and catalogs; and most recently in tapes, discs, and other electronic media. At first, information could not be "copied": it could only be reimplemented or transferred. People could build new machines or

devices that were copies of or improvements on the original; people could tell each other things and share wisdom or techniques to act upon. (Reimplementation was cumbersome and re-use did not take away from the original, but the process of building a new implementation – a new machine or a trained apprentice – took considerable time and physical resources.) Later, with symbols, paper, and printing presses, people could copy knowledge, and it could be distributed in "fixed" media; performances could be transcribed and re-created from musical scores or scripts. Machines could be mass-produced.

With such mechanical and electronic media, intellectual value could easily be reproduced – and the need (or demand from creators) to protect intellectual property arose. New laws enabled owners and creators to control the production and distribution of copies of their works. Although reproduction was easy, it was still mostly a manufacturing process, not something an individual could do easily. It took time and money. Physical implementation contributed a substantial portion of the cost.

Now we face a new situation: not only is it easy for individuals to make duplicates of many works or to re-use their content in new works, but the physical manifestation of content is almost irrelevant. Over the Net, any piece of electronically represented intellectual property can be almost instantly instantiated anywhere in the world.

Controlling copies (once created by the author or by a third party) becomes a complex challenge. You can either

People want to pay only for what is perceived as scarce – a personal performance or a custom application, or some tangible manifest (by nature or by fiat; that's

ey onto the meter by providing a credit card number, which the meter then verifies by modem. When a user requests a program off a CD-ROM or an online database, the meter subtracts the appropriate amount from the user's credit balance and then downloads and decrypts the data. Downloaded programs may be set so that they live for only a few days or uses.

Sprague likes to illustrate how data metering will change the software business with this challenge: "Go out and try to find a spell checker for German. Chances are you won't be able to find it in any store." His point is that with limited shelf space, stores can stock only the products they know will attract a large audience. But metering schemes afford infinite shelf space, because the store is virtual. That means niche applica-

tions are economically viable. And it means customers can instantly obtain almost any program they want.

Data metering exploits the fundamental ease of distributing digital information. By collecting a toll at the user's computer rather than at some distribution point, you can cut out a lot of the middlemen, as well as the costs of packaging. And that means cheaper software.

Metering systems will also help eliminate software piracy, says Thomas Lipscomb, CEO of Infosafe. Software will have built-in hooks that start the meter ticking. So, it doesn't matter if you copied the program from a friend – you'll still have to pay to use it. These software hooks also allow a wide variety of charging policies. Five dollars, say, every time you print, or US\$20 every

time the program is run.

The advantages of data metering have been known for a long time. Ryoichi Mori, a professor at the University of Tsukuba, in Japan, first came up with the idea more than 10 years ago. But only now has the technology become cheap enough and secure enough to be practical. This isn't to say all the problems have been solved: there remain nagging technological, social, and business issues, any one of which could stop these metering schemes in their tracks.

Surprisingly, it's the technical issues Infosafe and Wave worry the least about. True, both products use powerful encryption schemes and patented security techniques to protect the user's credit balance and the data being delivered. But neither Infosafe nor Wave claims its system is impervious to a deter-

mined hacker. Instead, the two are staking their reputations on the belief that if it is hard enough to break the system's security, most people will just pay. As Lipscomb points out, the existence of the copy machine hasn't destroyed the publishing industry. Besides, argues Sprague, "total security would require a complete change of computer architecture. And that isn't going to happen."

Infosafe and Wave are only slightly more worried about social issues, such as privacy concerns. True, metering systems keep close track of what programs you use and what data you download. But, as metering advocates are quick to point out, the same can be said of credit cards. Nonetheless, computer users are notorious for their dislike of anything that smells like "Big Brother inside."

control something very tightly, limiting distribution to a small, trusted group, or you can rest assured that eventually your product will find its way to a large nonpaying audience – if anyone cares to have it in the first place.

But creators of content on the Net still face the eternal problem: the value of their work generally won't receive recognition without wide distribution. Only by attracting broad attention can an artist or creator hope to attract high payment for copies. Thus, on the Net, the creators give first performances or books (or whatever) away widely in hopes of recouping with subsequent works. But that breadth of distribution lessens the creator's control – of who gets copies and what they do with them. In principle, it should be possible to control and charge for such widely disseminated works, but it will become more and more difficult. People want to pay only for what is perceived as scarce – a personal performance or a custom application, or some tangible manifestation that can't easily be reproduced (by nature or by fiat; that's why the art world has numbered lithographs, for example).

The trick is to control not the copies of your work but instead a *relationship* with the customers – subscriptions or membership. And that's often what the customers want, because they see it as an assurance of a continuing supply of reliable, timely content.

You can, of course, charge a small amount for mass copies. Metering schemes will allow vendors to charge – in fractions of a penny if desired – according to usage or

users rather than copies. (See "Software Metering," page 137.) Yet much as I find the approach of metering and tagging information intellectually appealing – and I especially like Mark Stefik's "rights language" (see "Tracking Usage Rights," page 140) – it won't much change the overall approaching-zero trend of content pricing. At best, it will make it much easier to charge those low, low prices.

Seen one, seen them all

There are other hurdles on the Net for content creators. One is the rise of a truly efficient market for information. Content used to be unfungible: it was difficult to replace one item with another. But most information is not unique, though its creators like to believe so; there are now "specs" for content such as stock prices, search criteria, movie ratings, and classifications.

In the world of software, for instance, it's becoming easier to define and create products equivalent to a standard. Unknown vendors who can guarantee functionality will squeeze the prices of the market leaders. Of course the leaders (such as Microsoft) will continue to win because they can use almost-free content to sell ancillary products or upgrades, and because they've reinvested in loyal distribution channels (even though they don't own them). In a sense, the content is advertising for the dealers who resell as well as for the vendors who create.

Overall, it will become easier either to reimplement the use of a software product – or, more significantly, to



estation that can't be easily reproduced why the art world has numbered lithographs, for example).

It's the cold business realities that make Sprague and Lipscomb lose the most sleep. Who's going to buy these metering devices if there is no software out there for them? And who's going to develop software for meters that no one has? The solution Infosafe and Wave have come up with is, as Sprague puts it, "to sell the chicken with the egg." In other words, bundle the meter along with the software. Indeed, Infosafe is already doing that with Design Palette – a collection of 43 CD-ROMs, packed with tools and images for graphic designers, that comes with a meter included.

In the end, most software industry analysts agree that metering devices will eventually be used with expensive, business-to-business content. But for consumer applications

like games, experts are more pessimistic. The only way it will work, they suggest, is if meters are built into the motherboard of every PC. That's not completely out of the question. After all, DAT players are sold commercially with circuits that prevent unauthorized copying, despite the added cost. But then again, consumers never really adopted DAT players, as they didn't seem to offer much of an advantage. And that's the situation Wave and Infosafe find themselves in now: they need to convince us that the benefits of metering are significant enough for us to put a toll collector in our computers.

Wave Systems Inc.: +1 (212) 755 3282. Infosafe Systems Inc.: +1 (212) 867 7200.

– Steve G. Steinberg

implement the solution to a particular problem in an alternative way. The *definition* of the problem, rather than its solution, will be the scarce resource in the future.

In entertainment and art, pricing will drop likewise, as more creators compete for attention with content they make using low-cost, easy-to-use production tools. Rather than hitting the big time, more artists will find their audiences within their local communities – geographical or Net-based. Local barriers to entry will be low, but global competition will be strong. There's the odd movie star or work of art for which no substitute is acceptable, but most entertainment is a way of spending time – not a unique experience. As Mark Stahlman of NewMedia Associates Inc. points out, almost every variety of recreation – from reading a book to going out on a date – converges on the same amount when figured in dollars per hour of experience (currently between US\$1 and \$2 per hour). People unwittingly value entertainment content by the hour as if it were all an interchangeable commodity.

Paradise lost and regained

The idea that intellectual property on the Net can lose its value horrifies most of its owners and creators, but it's

not new. It's happening already in the software business. Most software products are becoming commodities, not because they are easy to duplicate precisely (which is illegal), but because they are easy to imitate. Customers tend to want the original product: that forces prices down as knock-offs attempt to gain market share and the original attempts to maintain it by lowering prices.

Overall, in each market, there are likely to be a few leaders who create and protect content with a strong identity (perhaps promoting it with free content). Other players in each market will have a difficult time selling content as assets and will have to find new ways to collect rewards for their creativity. Owning the intellectual property is like owning land: you need to keep investing in it again and again to get a payoff; you can't simply sit back and collect rent. To some, this state of affairs may seem unfair. It certainly is if you grew up by the old rules and don't want to play in a new game. But if you look at the new rules by themselves, they have a certain moral grounding: people will be rewarded for personal effort – process and services – rather than for mere ownership of assets.

Owning land gives you the right to charge for the value you put into it. But the business of real estate is increasingly concerned with location and ancillary conditions such as zoning rights and obligations. Yes, land ownership matters,

but it's not the most interesting factor in real estate today. The same is true in the Net world: content ownership matters, but it's hardly the key factor in intellectual commerce.

The curve of intellectual value

The value of content follows strange curves. When only a few people are interested enough – to attend the party, watch the TV show, shop at the mall – it's generally not very valuable. When or if an item becomes a standard, it gains in value, both in the aggregate and per user. Users can cooperate with each other and share data: Juan and Alice can share the experience of watching John Malkovich in *In the Line of Fire*; the price of gold goes up as more people believe the price of gold will go up and start buying it in hopes of getting rich; the party's more fun when all your friends are there. But at some point that value peaks: the party's too crowded; the star is passé.

By contrast, other kinds of value are greater when they're exclusive: you're the only one in the market, you have a special formula for toothpaste, or you know a particular place to find oil. But many kinds of information flow from one bucket to the other; the first guy gets the advantage, but after that, the value is maximized by spreading the knowledge widely or by postprocessing – adding synergistic value on top of it.

What makes any kind of real estate valuable? It's not mere buildings and facilities. There's a complex services, as well as location.

TRACKING USAGE RIGHTS

According to Mark Stefik, a scientist at California-based Xerox PARC, "the seeming conflict between digital publishing and commerce" can be overcome by fundamentally redesigning computer systems. In his paper "Letting Loose the Light," Stefik proposes a solution reminiscent of software metering, but far more radical. It rests on two key components: trusted systems to store information, and usage rights to define exactly what a user can do with a digital work.

Think of a trusted system as a device that can be trusted to follow the law. The device might be a computer or a CD player – whatever medium, the owner would be unable to use it to make an illegal copy. By storing unencrypted digital information only on these trusted systems, the fluidity of information can be controlled. In Stefik's scheme every

digital work is assigned several levels of usage rights. For example, the usage rights for a CD might allow the user to listen for 25 cents, or make a copy for US\$5. These usage rights can be nested, one within another, so that a digital work can include other people's work while ensuring everyone gets paid. A music compilation might have a separate usage right for each track, defined by that track's creator, as well as a usage right for the entire CD, defined by the CD's publisher.

Stefik isn't stopping with the paper description of his scheme: he's filed for a number of patents on the underlying technology and has put together a business team. But Stefik admits that compromises are in order to make his scheme economically viable.

Mark Stefik:
stefik@parc.xerox.com.
– Steve G. Steinberg

Some aspects of intellectual property can be fixed into a specific medium and copied. But other less fungible or reproducible aspects of content cannot easily be instantiated or transferred. Their worth is realized only through human attention and interaction. Let's call it intellectual value rather than intellectual property. Intellectual value comprises content such as performances; teaching, training, and coaching; analysis of specific questions applied to specific situations, and personal attention – someone reading and responding to your e-mail, answering questions, or watching you on a video connection.

Intellectual value (some call it context) is also simply the presence of other people, often specific ones, interacting casually or formally. This value is the difference between sitting in a packed stadium and watching a pickup ball game with a couple of friends. It's the difference between the \$500-a-plate dinner with 1,000 people in a hotel ballroom and the \$10,000-a-head 40-person reception beforehand in the presidential suite. It's the difference between an off-the-rack special and an original from Dior – or the "free" gown your mother wore at her wedding 50 years ago. Value and uniqueness interact in mysterious ways.

The intellectual value of context can't be replicated so easily over the Net. Unsurprisingly, it depends on the activity or presence of a person – locally or remotely, in real time

or at least in individual response. Intellectual property is the embodiment or automation of effort, replicable easily for all. Intellectual value, on the other hand, is the effort, service, or process itself; it can sometimes be shared, but the effort can't be replicated without another person around to do the same task.

Precisely because it is scarce and unreplicable, this unreplicable kind of content is likely to command the highest rewards in the commercial world of the future.

Approaching zero

These trends are already beginning to play out. For example, while most packaged software vendors continue to fight the perennial battle against software piracy, others have chosen to begin adopting a different business model. Except for the leader in each field (Microsoft Corp., Oracle Corp., Autodesk Inc., and a select other few), not many software companies can survive on the sale of intellectual property alone. The price of most packaged software tends toward (although it rarely reaches) zero.

So, what happens in a world where software is basically free? Successful companies are adopting business models in which they are rewarded for services rather than for code. Developers who create software are rewarded for showing users how to use it, for installing systems, for

DIGITAL WATERMARKS

When Geoffrey Rhoads, an engineer from Portland, Oregon, thought about selling some of the digital astronomical images he'd been developing, he hit on a critical problem. Once in digital form, there was no easy way to "sign" his planetary pictures to prove they were his.

It took him only a few weeks to come up with a solution.

The answer lay in a mathematical technique to hide data, such as a signature or ID number, inside an image. The data is invisible, but a computer can analyze the photograph and pull out the hidden data. Here's why his development is so innovative: it's impossible to strip the invisible code out of the photo without completely mangling the image.

Think of Rhoads's scheme as a digital watermark, a unique identifier that becomes part of the document and can't be removed. Rhoads has filed five

different patent applications to cover his technique, and started a company, Digimarc Corporation, to commercialize the new technology.

Roger Dillan, a member of Digimarc's management team, says photographic stock houses are an example of where digital watermarks will be used. "By placing invisible codes into their digitized images, stock houses will be able to distribute photographs with less fear of piracy," he says. In fact, if the code number is changed every time the photograph is sold, the stock house will even be able to track the piracy back to the original source.

Digimarc isn't the only group working in this area, but it seems to be closest to a market-ready product. Digital information may never quite be the same.

Digimarc Corporation: +1 (503) 626 8811, info@digimarc.com.

—Steve G. Steinberg

Interaction between the tenants and visitors, the physical plant and space in cyberspace works similarly.

developing customer-specific applications. The real value created by most software companies lies in their distribution networks, trained user bases, and brand names – not in their code.

What Novell Inc. really is selling is its investment in training certified NetWare engineers, instructors, and administrators, and its perceived ability to produce and sell widely the next release of NetWare. (Selling the next release is essentially selling vaporware, but note that vaporware is not just a spurious form of advertising. Well-managed vaporware enables developers and customers to plan effectively; it is part of the value a software vendor can provide. But it works in the long run only if it is legitimate.)

Packaged software is a property, but in many ways it is becoming simply an advertisement for follow-up goods and services – bug-fixing, support, upgrades, training, implementation, and development services. The price of the software covers production and distribution; the intellectual content is free.

Consider Cygnus Support, a profitable five-year-old company (on whose board I sit); had 1994 revenues of more than \$5 million and whose customers include Cisco Systems, Hitachi America Ltd., Motorola Inc., and Sun Microsystems Inc. Cygnus successfully sells support and implementation services, along with free copies of software

from the Free Software Foundation (GNU C compilers, Unix, tools, et cetera).

Much of its work is porting free system software to a particular vendor's hardware implementation, a task paid for by the hardware vendor, or by the customer. The resulting implementation is freely redistributable (as provided by the rules under which the free software is distributed). Of course, the hardware vendor gets the benefit of its existence, since it makes his hardware products more attractive and "advertises" them. A single company, or individual, may create the intellectual property, while others may provide support services.

A similar situation often crops up in publishing. "Give us your information," a publisher says to an author, "and we'll classify it, put it online, and send you a royalty depending on how many people access it or how long they spend with it." Yes, the content creator is selling intellectual property, but unless this creator has a very strong identity, the balance of power will shift to the publisher, who controls the channel to the customer.

The bifurcation of content

Would you pay more for Michael Crichton's words, or for the ability to suggest a new plot to him or name a hero? How much was his book worth **182 ►**



Jonny looks around, confused, his train of thought disrupted. He collects himself and stares at the teacher with a steady eye.

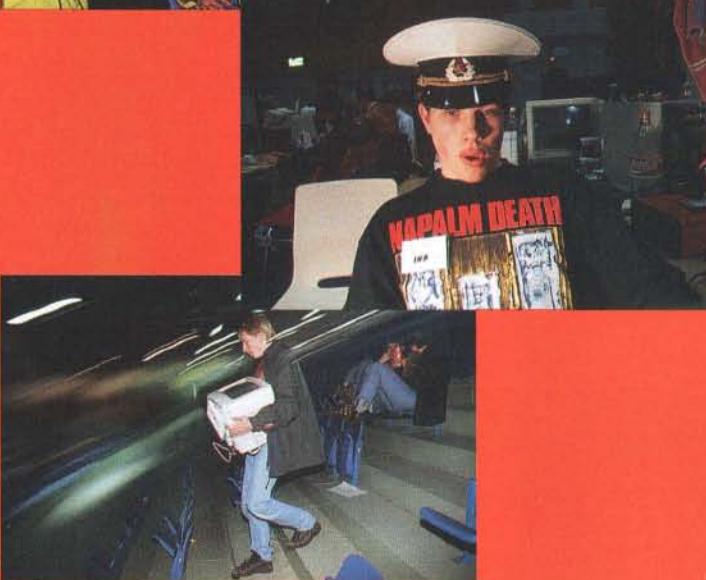
Demo or Die!

"I want to code demos," he says, his words becoming stronger and more confident as he speaks.

"I want to write something that will change people's perception of reality. I want them to walk away from the computer dazed, unsure of their footing and eyesight. I want to write something that will reach out of the screen and grab them, make their heartbeats and breathing slow to almost a halt. I want to write something they are reluctant to leave, knowing that nothing they experience that day will be quite as real, as insightful, as good. I want to write demos."

Silence. The class and the teacher stare at Jonny, stunned. It is the teacher's turn to be confused. Jonny blushes, feeling that something more is required. "Either that or I want to be a fireman."

— from PC Demos Explained, on the Web at <http://www.mcs.net/~trixter/html/demos.html>.



Demos are the last bastion of passionate, enthusiast-only programming.

It's not a true story, but it sums up the demo coding ethos just fine. If you're young, like computers, and have plenty of free time, there are three main ways to impress your peers. You can hack into other people's systems, you can crack the copy protection on games software, or you can code demos.

Years ago, young people used the term *demo* as shorthand for a political march or rally. Now, to thousands of computer-obsessed kids across Europe (and a growing number in the US), it's more likely to mean a short, self-contained graphics-and-sound demonstration program. But it isn't a demonstration of a game or business application, and it hasn't been commissioned for

any ulterior commercial purpose. The only thing it demonstrates are the skills of its programmer — or, more often, the skills of a group of coders, graphic artists, and musicians who've grouped together. And the only reason it has been written is to show off.

Demos are the last bastion of passionate, crazed, enthusiast-only programming, crafted purely for the hell of it by inspired teenagers working entirely in their spare time. The teens create jaw-dropping audiovisual effects beyond the dreams of most multimedia designers. Constantly striving to better their rivals, devotees of the demo scene cram spectacular three- or four-minute presentations onto a single 800-Kbyte floppy disk, fitting them

into tiny amounts of memory. Freely spread by disk-swapping over bulletin boards and other sites on the Internet, then replayed on home computers all over the planet, each demo becomes a piece of digital graffiti, proclaiming the superiority of the gang that created it. Demos are made by the rock-and-roll groups of code.

The demo scene is driven by competition, visible at its best in huge three- to five-day demo parties, which take place during the school holidays in mainland Europe. Thousands of young coders attend these events, their latest works proudly on display. Most demos follow a traditional structure — vivid animations, spinning polygons, and assorted

video effects, all pulsing to a techno, rock, or jazz soundtrack. (A second, quieter sequence scrolls the credits, comments, and greetings to other coders, often in charmingly bad English.) But the discussions and voting that decide the best are always heated and controversial, because what drives every demo coder is the overwhelming desire to create something new, something spectacular, something cool.

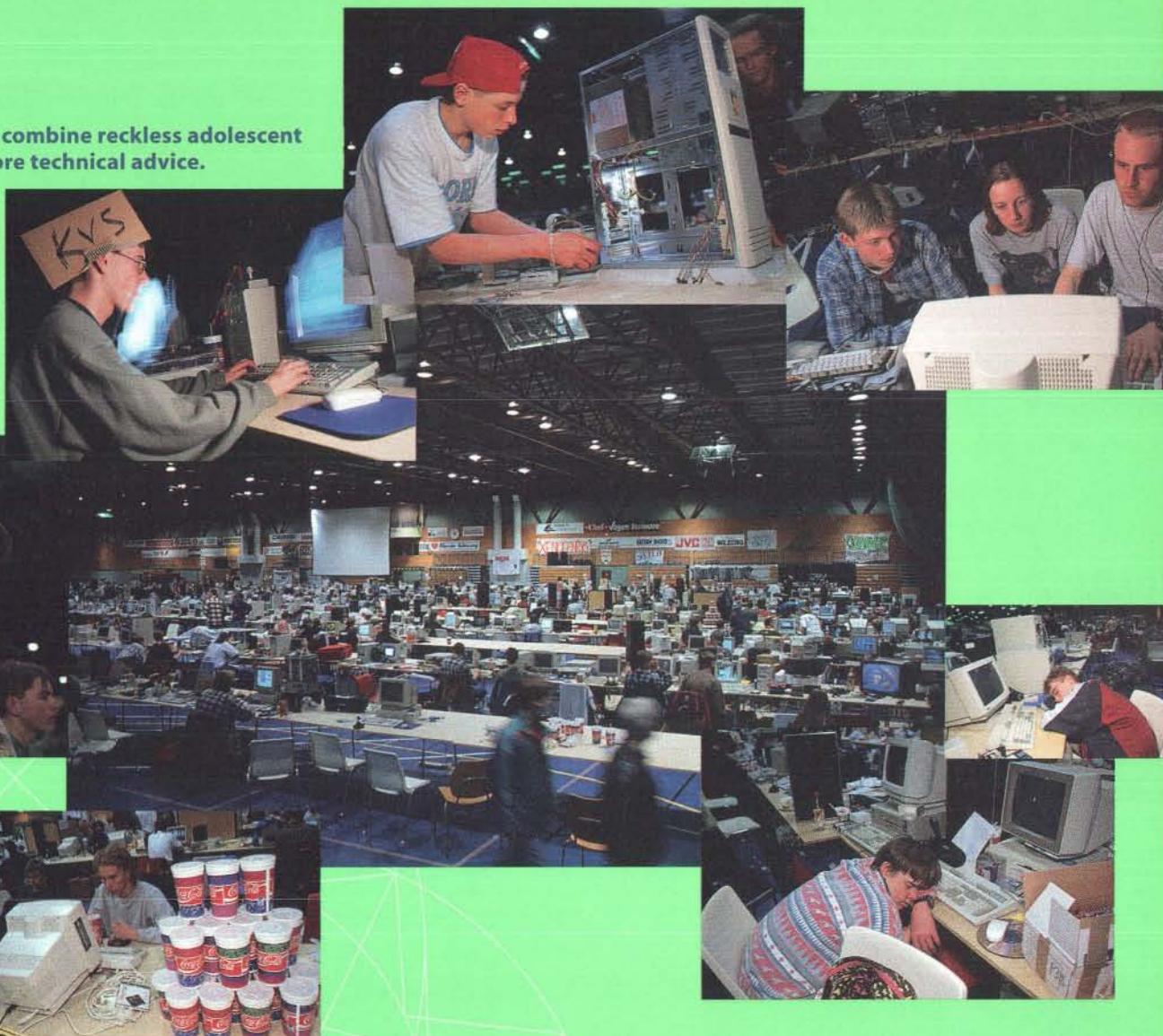
Despite growing European press coverage, demos have remained part of the computer underground — they first appeared in Northern Europe in the early '80s as add-on introductions to illegally "cracked" computer games. Terrified of playground piracy, software compa-

Demo or Die!

You're a teen hacker,
you want to impress,

by Dave Green

Demo parties combine reckless adolescent enthusiasm with hard-core technical advice.



nies experimented with means of making their games disks copy-proof. For hard-bitten hackers sitting at home looking for a fresh programming challenge, this was like putting a red rag in front of a bull. They'd spend hours (or days) cracking the copy protection, and then, pleased with their achievements, would write a brief audio-visual intro sequence claiming credit for it before redistributing the pirated warez to their contacts and friends.

As the abilities of home computers (and programmers) grew, the intros to cracked games

became more and more impressive, and they began to get distributed in their own right. And so the demo scene was born.

Today's demo scene is packed with works of astonishing sophistication. Everyone you ask has a favorite: *Human Target*, from French coding team Melon Dezign, was one of the first to synchronize all the graphics to the music; the groundbreaking *Jesus on E's* by UK group LSD combines a rave soundtrack with flickering counterculture imagery. *Switchback* by Rebels takes you on a rendered high-speed roller coaster ride, while *State of the Art* by Spaceballs replays vast digitized video sequences as collections of animated polygons. The

coding groups responsible for these (and many other) titles average about two or three big releases a year, each representing many teen-hours of programming, art work, and design.

Until fairly recently, demos like these have been almost exclusively a European phenomenon, running on the Euro-coders' favorite home computer, the Commodore Amiga. Historically, demo origins can be traced to early 8-bit home micros like the Commodore 64 and Apple II, but demos (and their corresponding culture) really took off when Commodore's 16-bit Amiga hit the market in 1985, with its hi-res graphics, 4,000-color palette, powerful video handling, and four-channel digitized sound.

As one coder put it, "We could really start experimenting with all sorts of stuff that made noncomputer people turn their heads."

Like games before them, demos swiftly evolved to a point where they were too complex and time-consuming for individuals alone to write. Inevitably, coding groups appeared, featuring a minimum of a programmer, a graphics designer, and a musician. Sometimes these would be groups of school friends with a common interest in computers, although larger groups started to form, working across national boundaries via bulletin boards, e-mail, and the Internet. They exchanged music, pictures, code, and homemade development tools, but never met in person.

Dave Green is the technology editor of Wired UK. Additional research for this piece came from Reward of Complex and Stelios of CnCd.

At first, these groups retained close links with the illegal pirate scene: traders would exchange demos for cracked games if they didn't have any warez of their own. "They were a currency at one point, a great currency to buy pirate games," explains ex-coder Jolyon Ralph, technical director of the Croydon, England-based Almathera Systems Ltd., publisher of several demo compilations.

This is still reflected in the demo scene's unique terminology – with its world of BBSes, busts (police raids on BBSes), and lamerz (noncoders, bad coders, or generally clueless individuals).

group) or stay with his friends in NVX – his mind was made up for him when NVX split up. Destiny then linked up with the famous Swedish group, Talent, so Oedipus formed a new group, Nebula, which he headed for a year, until arguments with co-manager Antichrist prompted him to take up an invitation from Pazza of LSD. Incidentally, Oedipus is 16.

Much of the demo scene's impetus came from the intense rivalry between manufacturers of two of the most popular 16-bit home computers of the time, the Commodore Amiga and the Atari 520ST. (In Europe, the high price

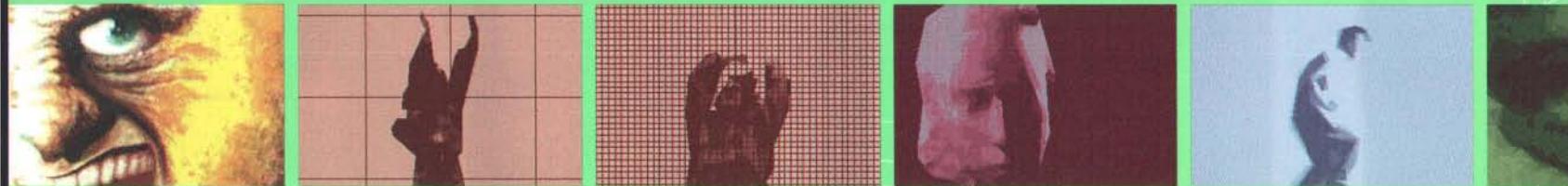
Cyberman 2 by Complex shows what



Ralph. "How do I prove that my Amiga's better?"

Competition between groups also helped advance the demo coder's art – Jolyon fondly recalls the BOB wars, an ongoing contest to animate the greatest number

Nine Fingers, by Spaceballs, converts digitized video into animated polygons.



Group members play with nicknames or handles, which means that news sheets (found on the scene's numerous bulletin boards and disk magazines) read like sports transfers or soap opera updates. They keep fans informed of new recruits and summarize the antics of existing members.

Groups form swiftly, poaching members from other teams; if your skills are in demand, you can expect to move around. Oedipus, currently with the UK group LSD, gives a detailed account of joining the relatively small group Trance UK as a C coder in April 1992: he was poached by rivals Nerve Axis (NVX), wondered whether to join Destiny (a larger

of IBM PC-compatibles kept them out of the home market until the early '90s.) In the early days, commercial software support was thin on the ground and technically disappointing, so users wrote

of BOBs (Blitter Objects, or independently moving graphics) on an Amiga screen at one time. "Somebody released a demo saying, Look at this, we can get 64 BOBs running around on screen."



LSD's Jesus on E's could easily pass for a low-budget pop video.

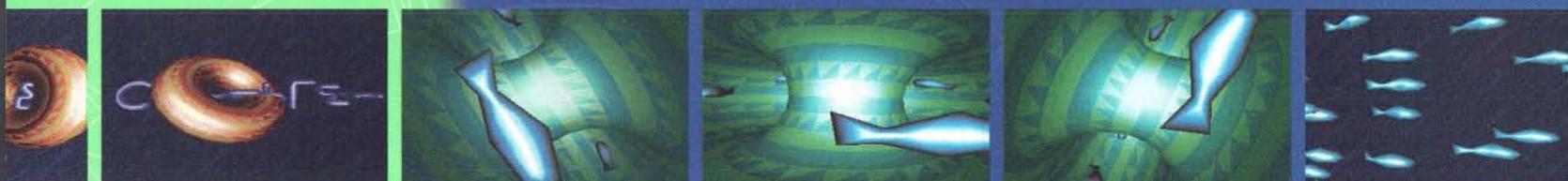
their own routines to demonstrate their machine's superiority. "I've got an Amiga and my friend's got an ST," mimics Jolyon

So, of course then somebody said, 64? I can get 68. – 68? I can get 80. – 80? And so on.... It got to around 200. One of our guys was

Switchback by Rebels climaxes with a high-speed roller coaster ride.



can be achieved in just 66 Kbytes.



a particular fan of the BOB war and was determined to win it. Eventually," says Jolyon, "it was won by someone who did infinite BOBs, but that was really a big cheat. But they were *all* cheats, so it didn't really matter."



Trained by cracking the protection on game disks, demo coders show little respect for the work of other programmers. Armed with memory-scanning routines called *rippers*, they can page through

demo scene handles Steve and THP. "When Spaceballs's *State of the Art* first came out, it didn't run on every version of the Amiga operating system," he explains. "So Skid Row took it, disassembled it, fixed the bugs, then re-released it with a sarcastic message at the end."

Coders generally don't set themselves any restrictions. "There've been a lot of attempts to do 3-D *Doom*-style graphics on the Amiga," Steve smiles, "simply because it's difficult, because of the way the display hardware is set up. Which means everyone has to prove that it *can* be done." As a result, 3-D environments are a common feature on current demos, and coder Gengis (erstwhile member of the French group Complex, now in

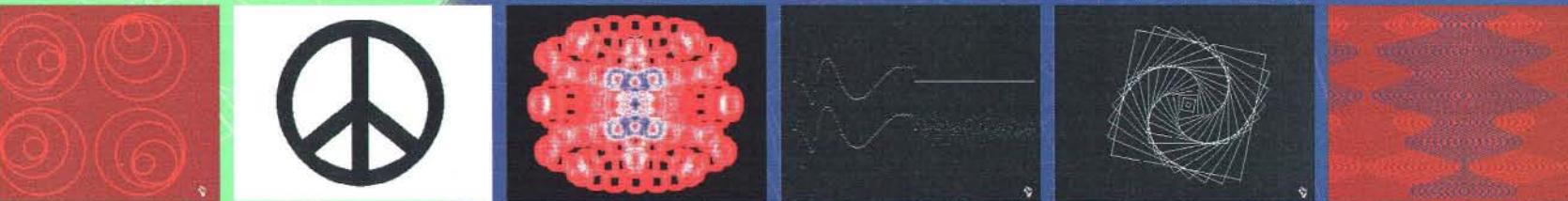
world environment of pirate bulletin boards – rather than how many useful commands you can add to the standard Unix kernel. It's how many assembler instructions you can execute in a single video frame (usually about one-fiftieth of a second). But the challenge, still, is to come up with the ultimate hack, the piece of code that makes other programmers stop and ask themselves, How *do* they do that?

Nowhere is this more apparent than at demo parties, the huge European conventions hosted by coding groups and organized entirely by amateurs. Funded by ticket sales and sponsor contributions, the largest include The Gathering (held in Norway at Easter), and The Party (held in

also cafeterias, showers, and sleeping areas – although most owners prefer to sleep with their computers for security – and, one imagines, some small amount of reassurance.

These are the trade shows – and the craft fairs – of the computer underground. "It's not often you can hook up with all the guys you've been talking to over BBSes, mail, and the Net," says Steve. If they're not working on producing a demo at a party, many coders spend their time socializing or indulging in the various group activities – networked *Doom*, in-jokes, gobbling pizza. "It's an absolutely electric atmosphere – you should see the web of power cables," he jokes.

Meeting these coders, designers, and artists for the first time is



the data of someone else's demo, extracting the graphics or sound as required. "The music is fair game," muses Jolyon. "If it hasn't been protected, the musician is happy for you to take it out. If the music *has* been protected, then it's obviously supposed to be a challenge, so again you're allowed to get at it."

"There's no mercy," agrees Almathera's CD cutter and self-confessed demo groupie, Steve. (Steve prefers not to give his surname, favoring instead his

smaller group Bomb) is putting the final touches to FEARS, a commercial *Doom* engine for the Amiga, based mainly on routines from his own award-winning demo *Motion*.

Listening to demo fans tell these and other tales, it's hard not to think of coders as modern-day equivalents of the '70s MIT pioneers in Steven Levy's *Hackers*. Rather than the rarefied atmosphere of time-sharing mainframes in academic institutions, now it's out there in the real-

Denmark every New Year); each resembles nothing so much as a cross between a computer show and a science fiction convention.

These events hire out conference halls with thousands of square meters of floor space, accommodating up to 2,500 people, their computers, desks, and tables for the equipment, as well as alternative sources of entertainment – video cinemas, laser-tag games – in case the appeal of checking out hundreds of demo routines wears thin. There are

a curious experience. If you're expecting wild-eyed cyberpunks on the cutting edge of industrial fashion, what's most surprising is how ordinary they seem. Sensible haircuts sit next to heavy-metal T-shirts, and the grunge look is as popular as sports-casual. It seems to be a cross-section of European teenagers who happen to like computers – the most overwhelming surprise is how young they are (many under 16, few over 20). They are almost all male – for whatever rea-

Just van Rossum

and Erik van Blokland

Letterroy™

if everyone who used their typefaces

paid for them.



By Erik Spiekermann

Wired: You made the first "random" typeface, called Beowulf, by replacing the commands "lineto" and "curveto" in the PostScript code with your own command "freakto." The new command calls up a random generator that makes the character outlines irregular. When you created Beowulf, were you trying to prove something, or was it just a joke?

van Blokland: It was quite a joke. We were both into programming – or would you call it hacking? What came of that interest was a very cool-looking thing. We wanted to make a typeface that looked very smooth and rounded off, but instead it became spiky, with little pointy bits sticking out from the edges of each character in a most unpredictable way. And what's the most fun about Beowulf is that every time you print it, those spiky bits take on a slightly different appearance.

You both have said that a designer, by definition, has to make things that haven't been made before. But why? Isn't it the job of the designer to work within a frame of reference which is commonly understood? If we use Egyptian hieroglyphs or Chinese writing here in The Hague, we won't communicate anything. But at the same time, as graphic designers who are trying to innovate and establish creative new ways of communicating, we have to be surprising and invent new images. What does that mean for type? Is it going to disappear or is it going to go back to images?

van Rossum: Type is definitely here to stay. Text won't disappear; in fact, you'll see more and more of it on screens. Images simply aren't strong enough or powerful enough to express everything you want to say. You can't make pictures to replace this interview.

How did Trixie happen? Wasn't it named after the typewriter you took it from?

van Blokland: On the way back from a type conference in 1990, we came up with two ideas for typefaces: we could digitize handwriting and we could use a dirty typewriter. Not long after that, we came up with JustLeftHand and ErikRightHand, which are simply scans of our respective handwriting. Trixie took a bit longer. We found an old typewriter (named Trixie), simply printed out all the characters, and then scanned them into our computers. But leaving all the dirt and all the irregularities in caused problems when we got to production. There were too many points on the outlines, making the files very large and the fonts almost impossible to print.

How about the other fonts you designed, the instant types – from rubber stamps, Dymo tape (embossed label tape), stencil letters, and other stuff you found in your attic and then you decided to use. That sounds a lot like marketing: "Let's do something trendy!"

van Rossum: It involved a bit more marketing than Trixie, which was modeled after the only type in people's homes – the typewriter – with its uneven ribbon, filled-in letters, and the occasional character that jumped up or down. But in the beginning, there wasn't any marketing idea. I saw this thing and thought, Let's make a typeface out of it. Then we

decided we needed a complete package, a family of faces. I had a set of rubber stamps I used to play with, and my dad had given me these stencil letters that he used for his architectural drawings. And then someone from FontShop came up with the originals for Karton – letters stamped onto the cardboard boxes from Apple. Everybody recognized the letters, but nobody considered it type. It's always just existed; nobody ever designed it. Now, people like Karton because it looks so ordinary, so modest. It's quite cool to have stuff on your computer that feels so familiar, unlike all that computer-looking bitmap stuff.

This was a hot phase in your life. First, you had a random font that played havoc with its own shape, then your own handwriting, almost unchanged. ErikRightHand and JustLeftHand have become incredibly popular because they happen to be good Dutch handwriting, not calligraphic. They look like the sort of handwriting everybody would like to have if they practiced and could write beautifully. And Trixie, the typewriter face, is the ultimate vernacular. People everywhere still recognize it, although typewriters hardly exist anymore.

Everybody still wants to be the first kid on the block to use a new font, and when you created Trixie lots of designers rushed to use it. What happens then? Does it become mainstream? Does that kill it?

van Rossum: Trixie is mainstream now, and in fact it's so mainstream that we can't stand it anymore. It's been around for at least three years. In Europe, almost all the hip cultural magazines use it when they want to express something that's brand-new, urgent, factual. In the US, it's been used by *Rolling Stone* and a lot of trendy local publications. When you're a type designer and you find your own typeface somewhere for the first time, it's a nice feeling. It's maybe a little like being a rock star, hearing your song for the first time on the radio. But it's a small and quiet pleasure. Nobody knows. And you know that you couldn't explain it to your friends even if you wanted to. I'm sure that even Sting doesn't know my handwriting is on his album cover.

Can you become famous and rich as type designers?

van Blokland: We would be rich if everybody who uses our typefaces paid for them.

Before the advent of desktop publishing and type-design tools, drawing a typeface could take a few years. It was expensive, time-consuming, and boring. But these days, type design is much more accessible. Should every graphic designer have to learn to design typefaces or at least manipulate fonts?

van Blokland: Yes. I call it type *tuning*. Type is a commodity, a thing that everybody can change. These days, if a designer doesn't like a typeface, it doesn't take long to go into it and change the kerning or the width or the shape of a character. We certainly have the technology, so there's no excuse to put up with bad type. ■ ■ ■

Just van Rossum and Erik van Blokland make up the formidable typographic duo LettError. They both came out of the Royal Academy of Fine and Applied Arts in The Hague, the educational institution in the Dutch capital that turns out type-face designers. Both in their mid-twenties, they have already come a long way professionally. After working at MetaDesign in Berlin for a few years when they were fresh from the academy, they spent time at David Berlow's The Font Bureau Inc. in Boston, Adobe Systems in Mountain View, California, and many other type shops. Not always together, but constantly in touch, they have jointly designed typefaces, written programs, created onscreen movies, performed at conferences, known among font mongers, online freaks, and ResEdit hackers. Wired sent Erik Spiekermann to meet the two and to suss out their take on typography today.

Erik Spiekermann, who designed the beautiful and practical Meta typeface, began experimenting with type at the age of 12. He now runs a German design firm, MetaDesign.

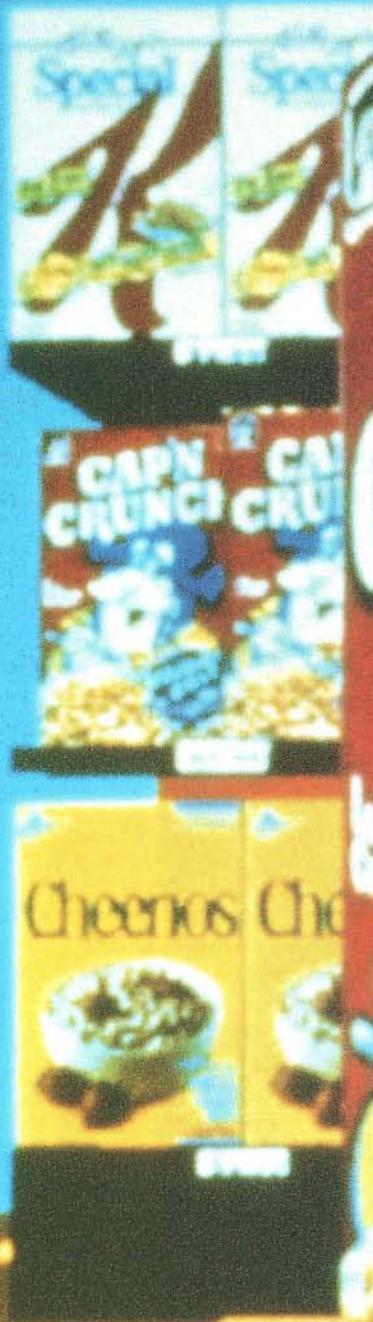
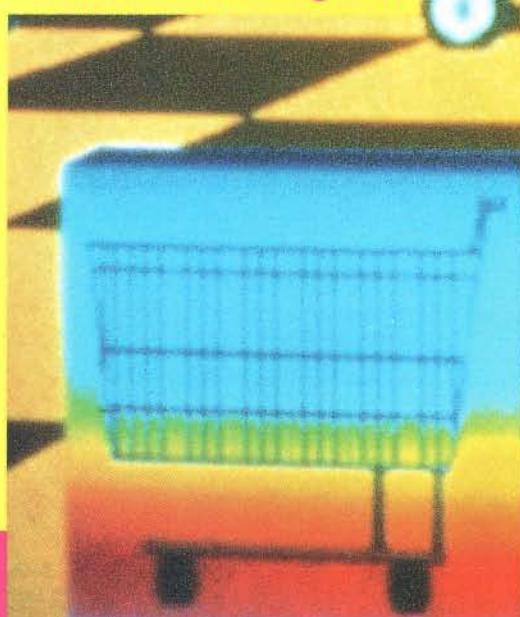
PEOPLE ARE SUPPOSED TO PAY FOR THIS STUFF?

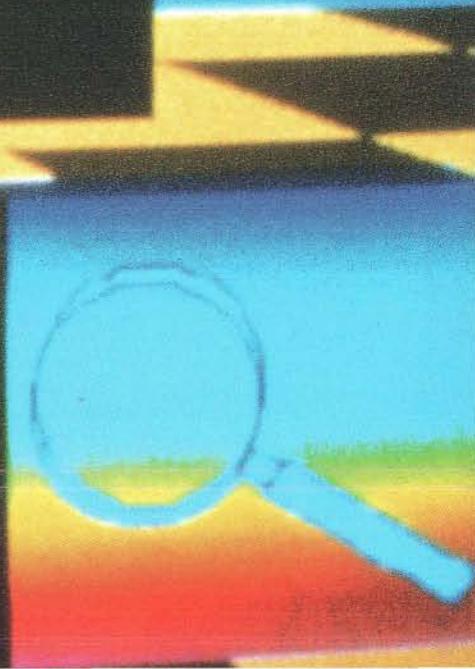
Crisscrossing the country, our intrepid correspondent visits corporate labs, model living rooms, and actual sofas – to check out the megahyped interactive television prototypes and see just how real the 500-channel, all-digital, high-fiber future really is. By Evan I. Schwartz

I t's lunch time on a Friday, and I'm working up an appetite, shopping on the television. I ain't watching no infomercial: I'm wielding an 8-inch remote at a GTE mainStreet marketing center – hard by Boston's Route 128 – controlling which products appear in front of me. The interface for GTE's mainStreet interactive TV service reminds me of the announcement boards on a local community access channel: low-budget graphics with Muzak in the background. Arranged in *Hollywood Squares* fashion on the opening screen are nine stylized photos, each representing a category, or "world," of activities. I've chosen world Number One: shopping, represented by a ribboned package. After blowing by screens that promote a virtual bookstore, a clothing boutique, and a flower stand, I linger at the Flying Diner specialty foods storefront, where I'm beguiled by a glistening, 9-pound, honey-glazed ham.

Evan I. Schwartz (eis@murrow.tufts.edu) is a Boston-based contributing writer for *Wired*.

Finally, hands-on:
GTE mainStreet
Microsoft Interactive Television
Time Warner Full Service Network
Bell Atlantic Stargazer





I've got a hankering for that ham. With a twitch of my thumb, I guarantee that this great hunk-o-hog will arrive tomorrow.

Then, all of a sudden, the screen freezes – like a PC with a memory-protection error.

This is how my bumpy cross-country tour of America's interactive television test towns began. My travels took me to corporate labs, model living environments, and real suburban sofas near cities such as Boston, Seattle, Orlando, and Washington, DC – a sampling of the places where the biggest telephone, cable, and entertainment companies have been setting up technology trial zones. I wanted to see for myself what's been billed as television's true destiny.

Perhaps, I thought, I would learn the truth about the 500-channel, all-digital, high-fiber world of the future. Will it be a happy time, bursting with "choice, control, and convenience," the mantra of every corporation getting into this business? Or will we take one look at it, snort, and go right back to reruns of *Baywatch*? For that matter, will it even happen? Will you want to "turn your living room into a mall," as the Time Warner brochures promise? Or are so many industries rushing to make television interactive for the same reason that dogs lick their balls – because they can?

With that thought in mind, I identified my quest: ignore the insider industry positioning and regulatory battles and get answers to the basic questions: Exactly what is interactive TV? What do people say they want from the experience, and what do they *really* want? What types of services will they pay for, and how much will they pay? Does interactive cable have staying power? Or will the personal computer end up with all the interactive goodies in the end? The answers to these basic questions will determine whether the New TV will be a multibillion-dollar bonanza or the biggest business boondoggle since New Coke.

The first home on the expedition is just a few miles from my digs in Boston. I arrive during prime time on a Tuesday at a two-family walk-up in Watertown, a smack-dab-in-the-middle-class community that borders Cambridge and happens to host the largest concentration of Armenians in the country. The residents, Seda and Dikran Kaligian, 29 and 33, live in a small apartment with classic movie posters on the walls and toys for their 10-month-old son on the floor. Recently, they got a call from Continental Cablevision, their cable company, which is helping GTE sell mainStreet as a premium service. "It sounded interesting, and I wanted to see what all the talk of interactive TV was about," Seda explains, handing me a cup of tea and inviting me to sit on a low-lying cloth sofa.

Turns out, the Kaligians were in the market for something interactive. They recently canceled Prodigy for their Macintosh because it was too slow. Actually, mainStreet isn't all that different. Like an online service, mainStreet ties up a phone line, this one jacked into the back of a special set-top box. The "upstream" signals from the remote travel over the phone line to GTE's central computers. Those computers then pump the programming "downstream" over GTE's fiber-optic rivers, which lead into Continental's regular coaxial cable offshoots and back into living rooms like this one. As such, the images appear much more quickly than they do on a PC with a modem – making mainStreet a kind of Prodigy with pictures.

Seda flicks on the tube and switches to mainStreet, which appears on cable channel 3. From the opening *Hollywood Squares* menu, we enter world Number Two: games. It's nine o'clock, the nightly time slot for MatchPlay, a multiple-choice program based on "repurposed" footage from *The Joker's Wild* series of the '70s. "It's so retro," Seda says. "I remember it from sick days when I was a kid." The host is none other than Jack Barry, who was portrayed in the

1994 movie *Quiz Show* as a conspirator in the 1950s game-show scandals. Here he is again, posing brain-bending questions such as "What was the last name of Barney, the nutty character played by Don Knotts? Was it: A) Rubble B) Fife or C) Google?" The choices flash on a graphics overlay that borders the video.

As we play, it becomes clear that the canned contestants on the tube are no match for the



The Kaligians try out GTE's mainStreet.

"All of us are really two people – the person we say we are in focus groups," says GTE's Barlow, "and the real person deep inside."

Kaligians. Seda points her remote while the footage automatically halts for five seconds to give home viewers time to answer. After pushing the B button, she watches a confused contestant with an ultrawide collar wager his guess: "That would be ... Google!" he blurts. "Google?" Seda laughs. "Google!?"

The Kaligians say they are happy interactive customers and will keep up their monthly subscription at US\$9.95. Seda says she uses it about 30 to 45 minutes per night, part of her average four- to six-hour TV day. Occasionally, they use the system's information services, most of which resemble one of those local information kiosks in an airport terminal. Recently, for instance, the family went out to eat after previewing the menu and decor of a local restaurant on their TV. And by calling up data from the system's Mobil Travel Guide, they learned about an inn in Amherst equipped with all-important cribs. But, they say, almost all of their mainStreet time is spent playing games.

As creators of the longest running interactive TV service, GTE is finally finding out what people

like the Kaligians really want. When the company first conceived mainStreet in the mid-1980s, the \$20-billion telephone giant naturally thought that peo-

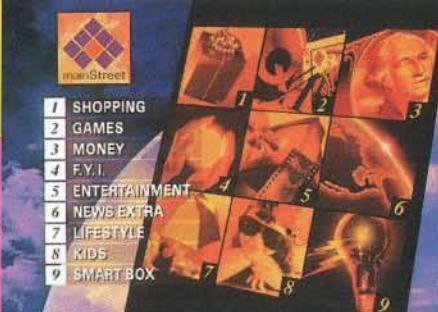
ple yearned for an interactive Yellow Pages to find information and buy things. Market research in affluent suburbs in the late '80s confirmed that hunch, as well as a crying demand for educational services, such as electronic encyclopedias. "We held focus groups to ask people what they wanted," recalls GTE's Barlow. "Number One, they said they wanted an interactive shopping center. People saw it as a time- and labor-saving device. You come home, pay your bills, shop, get your chores done, and go on with life. But we created the service based on that, and no one watched it."

Now GTE knows not to rely on focus groups. "All of us are really two people – the person we say we are in focus groups," says Barlow, "and the real person deep inside."

With that lesson learned, GTE went back to the drawing boards and repositioned the service based on usage data. GTE saw that people were mostly paying lip service to the education, information, and time-saving features. So, the company's new infomercials and marketing pitches hardly mention those. Instead, they

emphasize the fun and entertainment aspects of mainStreet – the ability to play along with game shows, compete in trivia games, predict during football season whether the quarterback will pass or run the ball, and participate in special events, such as voting for your favorite actors on Oscar night. Coming soon: betting fake money on horse races. GTE executives might not admit it now, but it looks like gambling could be their killer application. Too bad it's illegal to place bets over phone lines.

Without some new revenue source, the system may never be profitable. At the start of 1994, after 10 years of developing and testing the service, GTE set up mainStreet as a wholly owned



subsidiary and has spent roughly \$5 million each year over the past seven years, says Barlow. That's OK, say GTE executives. Just as long as it turns a profit sometime by the year 2003, when GTE projects that up to 60 percent of US households will have interactive TV. But that kind of reasoning begs the question: What's going to be the main draw between now and then? Will interactive games and sports be the ticket? Do people have some kind of deep, dark urge to sit on their couch and buy vowels from Vanna White?

It's possible. It could be that folks like the Kaligians are desperate to interact with the medium that they have been watching so passively all their lives. Perhaps there is a pent-up demand among sofa spuds to get their 15 minutes on a nightly basis. But it's also possible that this concept of "interactivity" is so superficial that after a while the novelty will fizzle.

Weeks after my visit, I called the Kaligians back and asked whether they were still excited about mainStreet's interactive game shows. "We don't play as often as we used to," Seda admits.

Next stop on the tour: Redmond, Washington, where Microsoft and cable colossus Tele-Communications Inc. plan to recruit 2,000 area homes by 1996 to test their incarnation of interactive TV. Cable subscribers in the area will get interactive games, information services, movies-on-demand, and a graphical program guide to search through all this new stuff. Fiber-optic threads radiate from a new "head-end" control room on Microsoft's corporate campus and link into dozens of scattered neighborhood "node" computers, where the data switches onto coaxial cables leading into living rooms. There, Compaq PCs are emulating the set-top box's role of decompressing the video and displaying it onscreen.

Overall, Microsoft approaches the business of interactive TV the same way it approaches computing. It wants to set the basic software standards and supply some applications while leaving the high risk of building capital-intensive hardware and networks to others. Microsoft has constructed an experimental network for this small test. But when the time comes to roll the technology out to the masses, it will delegate that work to partners such as TCI. "We won't dig up the streets and put \$10 billion into the ground," says Laura Jennings, senior director of marketing and business for Microsoft's Advanced Consumer Technology group.

Instead, Microsoft intends to make money by selling software, not only to TCI but to dozens of phone and cable companies that are sinking \$10 billion or so into the ground. Microsoft is creating not just the onscreen user interface, but also the MS-DOS-type software that operates the set-top boxes. Not to mention the Microsoft Media Server that sends

streams of video to thousands of those boxes, plus the software that manages the basic operations of the network. Taken together, this is known as the Microsoft Interactive Television "platform." Southwestern Bell Video Services is among the other companies that will test the platform when it strings up 47,000 homes in Richardson, Texas, starting in late 1995. At the same time it supplies basic software, of course, Microsoft is also creating content, such as PC-industry news programs, educational channels, and shopping services.

In the process, Microsoft seems to be projecting the economics of computing onto this new market, as if watching TV were an exercise in productivity akin to setting up a spreadsheet. "The TV must make the transition from a broadcast appliance to a tool," says Lowell Tuttman, a group manager under Jennings. But isn't that the most absurd of uphill battles? It's the computer that was designed as a time-saving device. Not the TV. The TV has always been a *time-wasting* device. It's there to entertain you, not help you get things done. GTE has already learned this lesson.

But it's not surprising that Microsoft headed down this path, especially as it and TCI have yet to supply this stuff to real people. In fact, I'm in town months before any real customers will get the technology. So, the most advanced home in the area right now is hidden inside Building 15 on the sprawling Microsoft campus. This is where many of the ideas for the upcoming test are being piloted for focus groups. On a Thursday morning, I'm accompanied by a Microsoft PR person past the reception desk, through a maze of halls, and just across the head-end control room, where we encounter a sign in the corridor that says: "The Microsoft Home. Invited Guests Only." Under the sign is a door bell.

The door is answered by a man with silver braces on his teeth and a blond crew cut. His name is Pierre de Vries, and his bio says

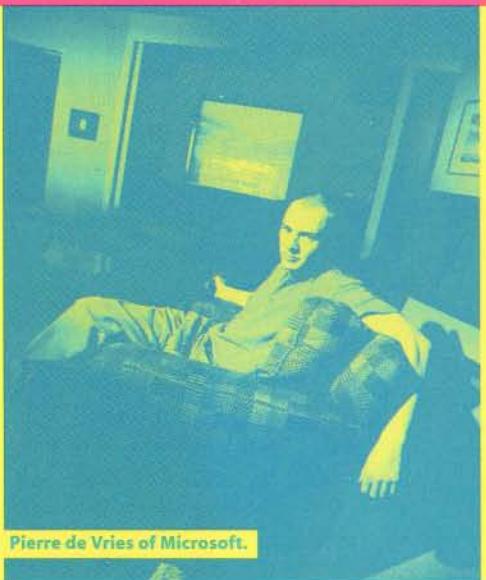
that he was "trained as a theoretical physicist at Stellenbosch and Oxford. He worked for some years for a London venture capital firm, evaluating and managing high-tech start-up investments. He then turned to sculpture, concentrating on installation pieces that explored the relationship of people in space." This is the guy Microsoft hired to determine what normal people want to do in their living rooms at night.

The Microsoft Home, as designed by Pierre, is more like a luxury condo. Every room has a screen, from the multimedia PC in the kids nook, to the financial news tube in the office, to the recipe tablet for "cooking apps" in the kitchen, to the projection screen in the den. The overall goal is fulfilling what Pierre calls his "vision of the extended family mediated through technology."

As we sit down on the deep leather sofas in the living room, the main electronic hearth completely absorbs my field of vision. First, Pierre demonstrates the video mailbox. We view a list of pretend incoming messages on the 50-inch screen. Pierre uses his remote to select a piece of mail that was sent yesterday at 3:32 by someone named Camille Savio. A woman appears. In a slight fish-eye view, she is standing in what looks like an airport at a public videophone – looking mighty confused and explaining that she was trying to reach someone else. This is much more enjoyable than your average wrong number, I must admit. But what if junk marketers got my video mailbox number? I have a feeling I'd be seeing much more of telemarketers from MCI and Visa than I would of Cousin Teri and Aunt Gilda.

The centerpiece of this demonstration is the interactive program guide. This early version of the guide groups broadcast programming, video-on-demand, and information services into categories such as news, movies, games, live sporting events, and shopping. This guide is fairly simple and non-intrusive: 10 numbered choices appear on a trans-

The TV has always been a time-wasting device. It's there to entertain you, not help you get things done.



Pierre de Vries of Microsoft.

parent overlay on the bottom half of the screen. It looks like an advanced version of the setup menus for controlling volume and color on any large-screen TV. You choose the corresponding number on the remote and progress into the submenu for that category. When you choose the video-on-demand option, for instance, you see a menu of movies listed.

The point of this and of all program navigators is to transform people from aimless surfers into efficient selectors. But just like the paper *TV Guide*, it presupposes that you'll know what you want to watch when you see it on a menu. If you have no idea — often the case for me — you're still going to surf through all the channels.

Microsoft has a solution for this, too. Instead of searching endlessly, Pierre figures that it would be interesting if the system had some built-in serendipity. To this end, a service called the Reactor presents nine random cartoon icons, arranged on the screen in the ever popular *Hollywood Squares* style. The viewer uses the remote to select three of them, such as a baseball, a globe, or a church. We picked the gun, lips, and elephant icons. The system then searches for a program that has these three elements in com-

mon. We ended up with the Sharon Stone movie *Silver*. What does an elephant have to do with this? No one can explain. Then we picked a guitar, a beach ball, and the Swiss flag. This time, we got a 10,000 Maniacs video. "Maybe people in the band are from Switzerland," Pierre guesses. Actually, they're from Jamestown, New York. But no matter. "It just reacts," he adds. "It's supposed to surprise you!" What surprised me is that he believes people would want to watch a program selected pretty much at random. Pierre may just be trying too hard on this one.

In fact, Microsoft seems to be over-intellectualizing TV, in the hope that the software giant can break 50 years of viewing habits and change why people watch. "People have a money budget and a time budget," begins Thomas Wong, Microsoft's advanced consumer technology research manager. "And people are willing to pay to save time," he adds. Thus, he says, they will use interactive TV to rent movies; shop for food, clothing, and household items; attend college and self-improvement classes; and get all kinds of information — all without having to leave their couch for time-consuming trips. That, he says, is what people in focus groups and surveys say they'll do.

I don't think so. The reality, it seems after my first two expeditions into interactive TV land, is that people don't care very much about saving time when they turn on the tube. The average American watches between four and five hours every day, according to Nielsen statistics. If they were so pressed for time, where

did they get these extra hours in the first place? People watch television for an entirely different reason: to feel that they are part of something larger than their own lives. Why else would so many people know so much about characters in Cicily, Alaska, and the *Melrose Place* apartment complex without learning the names of their real neighbors? TV watchers seek out characters and stories with which to identify. It's a deep psychological fix that can't be explained in economic terms. They also turn it on for company, as background noise. And who needs interactive background noise? *Hardcopy* will do just fine.

It's not surprising that Microsoft doesn't grasp this. So many executives from Bill Gates on down simply don't watch much tube. Instead, everyone here seems obsessed with cramming as much as they can into their ultrasqueezed schedules. On the rare clear and sunny day of my visit, I watched as 4, 5, and 6 p.m. rolled by: almost all the cars in the Microsoft parking lots remained in place. Isn't it time to go home? One employee tells me he nearly kills himself on Tuesdays to finish work and race home to watch his favorite show, *Frasier*, by 9 p.m. So many workers here make so much money and have so little time that requests for a pay cut in exchange for a less demanding job are all too common. These people want to buy back a piece of their lives. And they mistakenly think everyone else is like them. Which goes a long way toward explaining why Microsoft is hell-bent on misapplying advanced technology to solve problems that, for most people, don't exist.

Now it's on to the northwest suburbs of Orlando, Florida. The local economy here is built on fantasy, making it the perfect test zone for Time Warner Cable. On a sunny Thursday afternoon, I drive in my rental car up to Time Warner's Home of the 21st Century, a big white house that makes the Microsoft Home look

like a yurt. Created as an idea house by Time Warner's own *Southern Living* magazine, this \$700,000 dwelling is a high-tech jewel box perched at the edge of a newly sprung subdivision. I walk inside, meet up with Tammy Lindsay, the Time Warner PR person, and begin showing myself around while she makes a phone call. As I ascend the stairs, I innocently walk into the home office, where a television spouting a canned demo passes off this remark to me: "Feel like a trip to the mall, but don't have the energy? Try the interactive mall!" I'm insulted. Do I appear so worn out that I couldn't even hop in my car and drive a few miles to satisfy my overwhelming urge to shop?

But as Lindsay shows me around and I peer with her into the future of television, I learn not to take it personally. At last count, she tells me, there were 13 TVs here, each desperately seeking something to do. The TV in the master bathroom, after all, is as big as the one I have in my living room. This is more like a media theme park than a house. In fact, Time Warner advertises this as a tourist attraction and charges the public \$5 just to come inside and look around. Topping it all off is the fact that Lindsay is a former tour guide for Walt Disney World.

The most unwelcome site is a TV in the kitchen that presents Alfred the (Annoying) Electronic Butler, a talking, bespectacled cartoon face who does a bad imitation of an English house steward. Next to his face is a menu of tasks you can program Alfred to do throughout the day. "Chip, chip, cheerio! Wake up and smell the coffee!" he blurts each morning from above the oven. Alfred then customizes each of the home's seven electronic zones with its own mode of climate, security, and media. At night, Alfred can be preset to appear while the master of the house may be scarfing down milk and cookies. Choose "bedtime" from the TV's onscreen menu, and Alfred dims the lights, turns down the music, activates the alarms,

and says: "Good night, sleep tight, don't let the bedbugs bite. And don't forget to brush!" Lindsay thinks he's just adorable. I have to suppress an unsettling urge to strangle this computer-generated image.

Maybe I can relax a bit in the den, where the world of Time Warner's Full Service Network awaits. I sit down in a soft reclining chair, while Lindsay picks up a sleek remote that looks like it was designed by Braun. She points it at a set-top box that resembles one of the early, ugly IBM PC clones. The first image to appear onscreen is the Carousel, a 3-D merry-go-round image that she spins using the round, blue directional key on the remote. Ten different categories of interactive services are represented on the

home to a "node" stationed in the neighborhood. That computer converts it to laser light and transmits it to the Network Operations Center in an office park a few towns away. Once there, racks of black demodulators sort the data into radio and laser signals and zap them over to an AT&T network switch. The switch sorts the signals and routes them to the appropriate spot on one of 16 Silicon Graphics servers. The appropriate video on those drives is pumped back over the fiber-optic threads to the neighborhood nodes and to the set-top terminals, which decompress the video for display on the TV. All of the above takes place in a half second. And the whole process is a closed system, meaning the only content to appear are pro-

camera crews since getting the system last December that the family keeps a scrapbook and a video collection of appearances. For the Willards at least, the promise of interactive TV has already been fulfilled. Seems that whenever they watch it, they appear on it.

Oddly enough, Mr. Willard hints that he's already tired of the Carousel. "You can bypass it," he shows me, pushing buttons on his



I have to suppress an unsettling urge to strangle this computer-generated image.

grams that Time Warner decides to create or license.

Let's see what Time Warner's idea of real

people think of all this. At the time of my visit, less than 55 real homes are outposts for the company's Full Service Network. Many of those are clustered off the sidewalk-free streets of the Wekiva subdivision, located a couple miles from where Alfred the electronic butler resides. Fifty years ago, this area was a wooded hunting preserve with dirt roads. Then came suburbia and the Magic Kingdom. This is where the Willards live.

You know the Willards. This is the media-coached family whose members tell people like me how much they can't live without the Full Service Network. Karl Willard, 43, a financial planner, his wife Susan, 39, a homemaker, and their kids, Jaclyn, 14, and Brad, 12, have hosted so many reporters and

remote. "If you know that you want to get to movies, you punch 98, and you just go." Then, he hands the remote over to Brad, who switches to a college basketball game and sits emotionless in a blue leather chair. As a photographer from *The New York Times* takes 30 minutes to set up his equipment in the living room, Brad doesn't interact with the TV. He just watches the game.

Mrs. Willard swears that the interactive shopping features ease her daily burdens. Once, when she broke some glasses in the kitchen, she cruised the virtual Crate and Barrel store to order some more. Things cost about the same as they do in a real store, not including express mail charges. To me, all this seems about the same as a catalog, except you have to put up with these extraneous graphics.

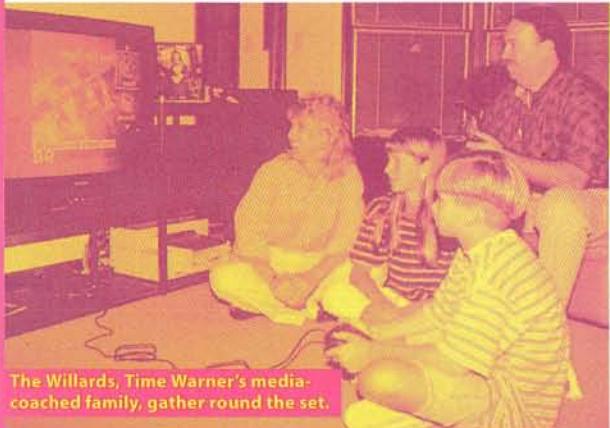
Mrs. Willard seems especially excited about the forthcoming ShopperVision feature. The Willards have already seen demos of the service, in which the viewer's cartoon grocery cart appears onscreen. Using the remote, you

push your cart down the virtual aisle, zoom in on graphical product packages such as Captain Crunch boxes, read the nutrition labels, and twitch if you want that product in your cart. Push a few more buttons, and you can ring up your purchases for same-day delivery to your doorstep. This seems terribly dehumanizing. It would put an end to thousands of years of human history in which eats have been gathered in a real marketplace filled with people. What's more, the economics are out of whack. The grocery business runs on 1 percent net margins. That allows little room for supermarkets to invest in elaborate electronic shopping services in which they have to render 3-D graphics for every product on their shelves. And even Mrs. Willard says she definitely doesn't want someone else picking out her tomatoes and melons.

Even the system's video-on-demand service seems unconvincing – at least at this stage. The Willards say they no longer visit their town's 16,000-title video store. But the Time Warner system offers only 60 movies now, with plans to bring that up to a whopping 150 by year end.

Mr. Willard insists that the new technology improves their quality of life. "We're a busy family," he says. Brad plays soccer. Jaclyn is a cheerleader. All members of the household say they watch TV only about two hours per day. This makes the time they do spend watching more productive, he says. "I definitely like to save time so I can get on to something that is enjoyable," Mr. Willard adds. "We're only on this earth for so long." He compares this system to the advent of the microwave oven. "I would literally fight them if they tried to take it away."

Yeah, but how much will he pay? Time Warner is now asking customers to pay \$2.95 per movie. Given that the Willards are probably among the

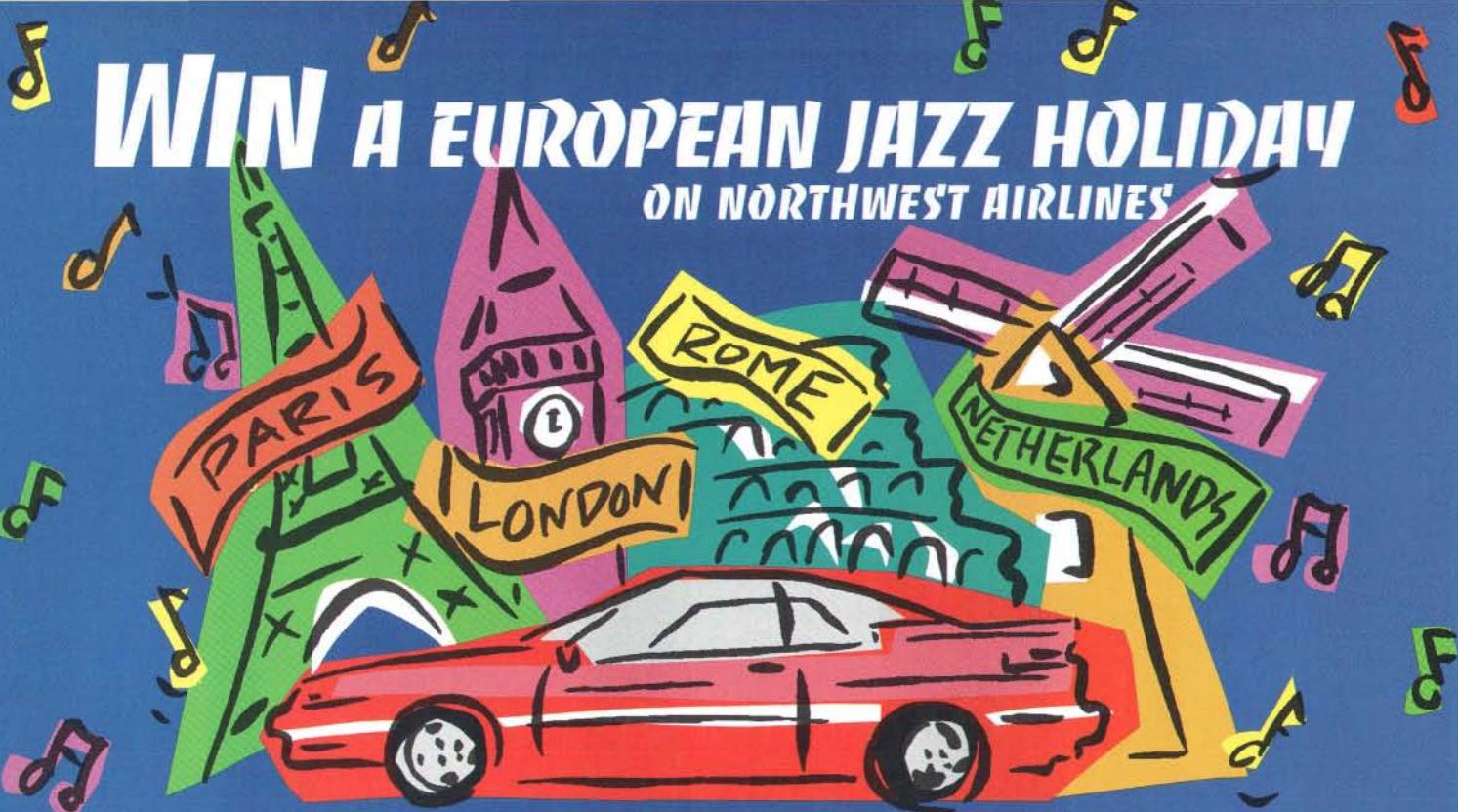


The Willards, Time Warner's media-coached family, gather round the set.

Carousel's graphical panels. Shopping, for instance, is symbolized by a green paper bag and a red-ribboned straw hat.

Everything on the system can be personalized. If your name, for instance, is Tammy, you can make a custom Tammy's News about, say, mutual funds, golf, and computers – while blocking out news of foreign affairs and Congress. You can create a hot list of your favorite movies for repeat viewing.

Sterile, high-tech cocoons such as this are made possible by an ultrafast network operating behind the scenes. When customers on couches use their remotes to request movies, news, and product information their signals are sent to their set-top terminals and then travel through coaxial cables leading from their



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Stereo Review

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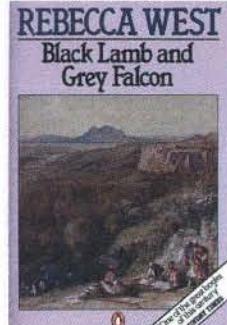
No purchase necessary. Void where prohibited. Sweepstakes open to legal US residents, 18 years of age or older, except employees (and their immediate families) of JVC, its agencies and service providers. Sweepstakes subject to Official Rules, available by sending a self-addressed, stamped envelope to JVC Jazz Festival Sweepstakes Official Rules, P.O. Box 5433, New Milford, CT 06776. Void where prohibited. Odds of winning and prize value determined by number of entries received. OH/HI residents only may mail the Match & Win number and name on one self-addressed, stamped envelope to JVC Jazz Match & Win Number, P.O. Box 5433, New Milford, CT 06776-5433, for receipt by 8/15/95. OH/HI residents only may mail 2nd Chance Sweepstakes entry to: JVC Jazz Festival 2nd Chance sweepstakes, P.O. Box 5413, New Milford, CT 06776-5413 for receipt by 8/21/95.

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Hot Spot

Anyone interested in the Balkans, the former Yugoslavia, Central Europe, or simply one of the most beautiful bodies of writing ever to appear in print should get hold of *Black Lamb and Grey Falcon: A Journey through Yugoslavia* by Dame Rebecca West. Written in the late '30s, it records West's journeys to Yugoslavia. But her treks are merely the backdrop to an engrossing and educational ramble through Balkan history.

Set aside some time: this book is 1,081 pages long, and every page has at least six sentences you'll want to

**A safe Balkan romp.**

underline and memorize for their sheer brilliance. What an extraordinary writer! I've found myself glued to *Black Lamb and Grey Falcon* till my eyes are groaning.

One of the great classics of the 20th century, this is still extremely relevant. In fact, it has just been reissued by Penguin 20th Century Classics.

It's fascinating and frightening to see how many of the great and terrible moments in history had their genesis in this ever-simmering cauldron. Are we at another such moment, one wonders? — Brian Eno

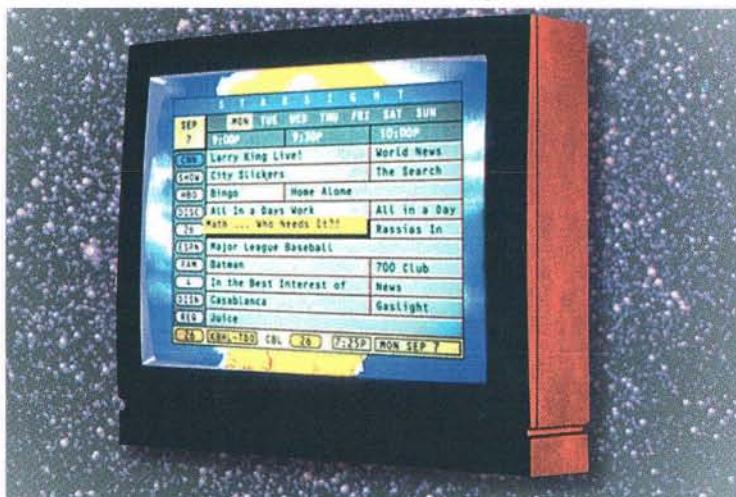
Black Lamb and Grey Falcon:
US\$20. Penguin Books: (800) 253 6476, +1 (201) 387 0600.

Channel Surfer's Guide

Hey, this is fun!" said my wife, who normally gives gadgets I bring home a cooler reception. StarSight is a program-guide system that grabs program information hidden in your local public TV station's signal and displays it on command.

The StarSight service is free for 30 days — to get you hooked. It will. It's about US\$4 per month thereafter. The StarSight schedule shows what's on and what's coming up, on broadcast or cable, for seven days. Unlike printed program guides, it's also possible to program this one to show only the channels I want, in whatever order makes sense to me — and I can arrange to tape a show just by clicking on its screen listing. I can also browse programs by type (comedy, sports, movies, etc.) and subtype (comedy movie, sitcoms, or specials), or bring up a station lineup for the next few hours.

I especially love the little blurb that tells me which station I've channel surfed into, what show is on, and how much longer it will be on — even



StarSight: A cross between Microsoft Windows and your newspaper's TV page.

during commercials. Another click of the remote brings up additional detail, such as plot summaries and the names of the stars. It's like a cross between Microsoft Windows and a newspaper's TV page.

Decoders that read the StarSight signals and put them on your screen are available in a set-top box from Magnavox for use with your present TV and built into TV sets from Zenith, Mitsubishi, and, soon, Sony and RCA.

The merits of the 27-inch Zenith I tried didn't end with StarSight. The set's sound and picture were good: rich, deep colors, and the kind of black and white you see on movie screens. Without the StarSight service, the Zenith won't show you what programs to expect, but the guide can still be programmed to show the name of each station or network you tune in to along with the channel number. — Ivan Berger

StarSight: US\$4 per month. StarSight Telecast Inc.: (800) 643 7827, +1 (510) 657 9900. Zenith StarSight color television: \$799. Zenith Electronics Corporation: +1 (708) 391 8181, fax +1 (708) 391 8334.

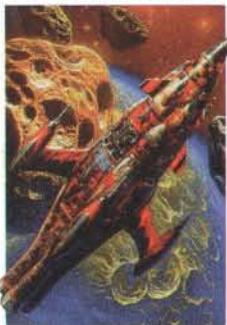




Spacey PICTs

I read recently that screen savers aren't really necessary, as modern computer monitors will outlast their users. Still, I couldn't resist getting a set of the superb astronomical wallpaper and screen saver images from Second Nature Software. Once loaded, you can choose one of these as a backdrop while you go about your everyday Windows business. The full selection will pop up every 10 seconds when you're not at the keyboard.

The series contains some of the best astronomical paintings ever: Space Voyages by Don Dixon features some 50 images of galaxies, planetary surfaces, and supernovae; Event Horizons, Spacequest,



Far-out screen savers.

and Cosmic Horizons contain scores of pictures by such famous space artists as Kim Poor, Robert McCall (including his famous study of the space station in *2001: A Space Odyssey*), and Michael Carroll.

Other screen saver collections include Life Beneath the Sea, Cats, Historic Planes, Classic Cars, and Animal Kingdom — something for everyone's taste! A percentage of profits from many disks benefit The Nature Conservancy. The images all come on diskettes, take only a few seconds to decompress, and give spectacular full-screen display. — Arthur C. Clarke

Second Nature Software Inc.: US\$16.99, +1 (360) 737 4170, fax +1 (360) 693 7869, e-mail info@secondnature.com.

To Hell in a Handbasket

Do you find your mind wandering while playing *Doom II* or *Heretic*? Do you long for a 3-D, six-axis motion, ultraviolet game experience? Before you get too cocky, plug in *Descent*. All true gamers have a healthy masochistic streak; *Descent* will put even the finest through their paces. Its 50 levels can reduce even the steadiest to a weak-kneed, babbling fool. This is one game that lives up to its massive hype.

The story line, if you care, isn't entirely original. In a nutshell, you play an independent contractor hired by the Post-Terran Mining Corporation to take care of a little problem: some power-hungry aliens have invaded the company's sublunar mining network. In case you haven't guessed, the action centers around large-scale annihilation of anything and everything in the mine shafts. Your PiroGX craft flies willy-nilly through the underground passages, and you try not to vomit. Between the dry heaves, it's a good idea to fire off as many rounds as possible before mining robots — hacked by the aliens — lay you to waste.

Descent is an immersive experience. It sucks you in and totally screws with your senses. Traveling upward, downward, backward, forward, and



Descent will reduce even the finest of gamers to a weak-kneed, babbling fool.

sideways at inhuman speeds, you quickly abandon your balance and sense of well-being. But soon, moving upside down feels as good as right side up — liberation is at hand. Flying by the seat of your pants, snagging weapons and ammo, you frantically try to figure out where the hell you are.

On a reasonably fast 486 PC or better, performance is excellent. I didn't cough up anything, but I fell off my chair several times in one particularly involved session. Up to eight players can play on one of four different network modes (anarchy with robots for me, please), and modem and IHHD Net play is supported with fluid results. *Descent* is one of the best PC games to bore its way into my brain in years.

To download the seven-level shareware version, check <ftp://wustl.edu> or <ftp://netcom.com>. Two top-notch Web sites devoted to *Descent* are at <http://doomgate.cs.buffalo.edu/descent/> and <http://www.eskimo.com/~stickman/descent/deshome.html>. One Web author has thoughtfully supplied the queasy gamer with tips for overcoming post-*Descent* nausea. Fun always has its price. — Scott Taves

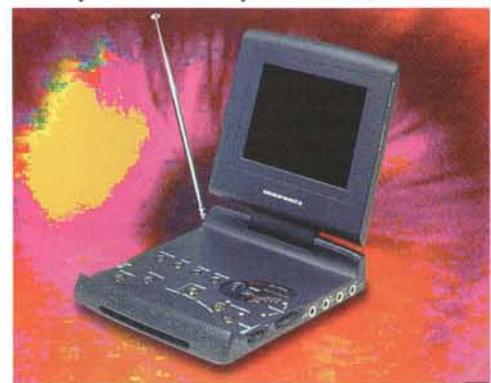
Descent: US\$39.95. Interplay Productions: (800) 969 4263, +1 (714) 553 6678, fax +1 (714) 252 2820, e-mail orderdesk@interplay.com, via the Web <http://www.interplay.com>.

Pocketful of Eyeful

A US\$799 TV set that has a 4-inch screen may sound absurd — but every time I slip the Marantz LCD TV out of my pocket and start watching it, a crowd of people assembles; most of them would like one for themselves. If the reception's good, the picture is that good.

The surprisingly bright, clear picture can even be watched outdoors, if you position it to minimize reflections. Its flexible design with movable screen and antennae help. But it's really the broad viewing angle of the active-matrix thin-film-transistor screen that makes this possible; you get full brightness and contrast within about 30 degrees to either side of the screen's axis and a reasonable view from 60 degrees. When you're finished watching it, the Marantz folds like a clam shell, forming a tidy package about the size of a supermarket paperback.

The mini speaker's tinny audio is not in the same league as the picture, but the sound through earphones (not provided) is good. The set's earphone jack is monophonic, so hearing the sound in both ears requires stereo headphones and a \$1.19 Radio



A teeny, tiny, super-duper TV from Marantz.

Shack adapter (#274-368).

TV reception is good in New York City. In my suburb, 30 miles away, reception is good on channels 7 to 13 and the UHF band comes in fair to poor on the lower channels. If you're farther from broadcasting sources, you'll have to attach an external antenna. On my commuter train, VHF stations don't come in well until I am nearly in the city, but UHF stations come in clearly from the moment I get on board. In fact, this little Marantz picks up UHF channels better than any bigger portable I've tried.

The manual is a trifle murky on how to store TV channels for quick tuning. A more serious problem is that the set doesn't say which channel you're picking up, so you have to guess while you're setting up the numbers. Also, six AA batteries last only about two and a half hours and aren't rechargeable. But an AC adapter is supplied if you're near an outlet.

All in all, the LCD-410 is just a portable television. What makes it special is that it's very good — and very, very portable. — Ivan Berger

Marantz LCD-410: US\$799. Marantz America: +1 (708) 307 3100, fax +1 (708) 307 2687.

Synapse Snap

Bad to the Beam

Forget contacting potential clients and organizing your life. For me, LaserCue is what personal technology is all about. This tiny, black, extremely scary-looking tube, which mounts on a pool cue like a scope, projects a solid-state laser through a collimating and line-generating lens. The effect? A bright laser beam down the axis of the cue, across the cue ball, and directly onto your target. The result? A better, tighter stroke and, ultimately, a better game as the amateur pool player learns to make the cue ball follow the projected line directly to the target.

The beam reveals any un-



Laser pool shark.

wanted lateral moves during drawback, forward-thrust, and stroke. If the beam is wobbling around, so is the cue, and you won't strike the cue ball squarely; a steady beam means a smooth stroke.

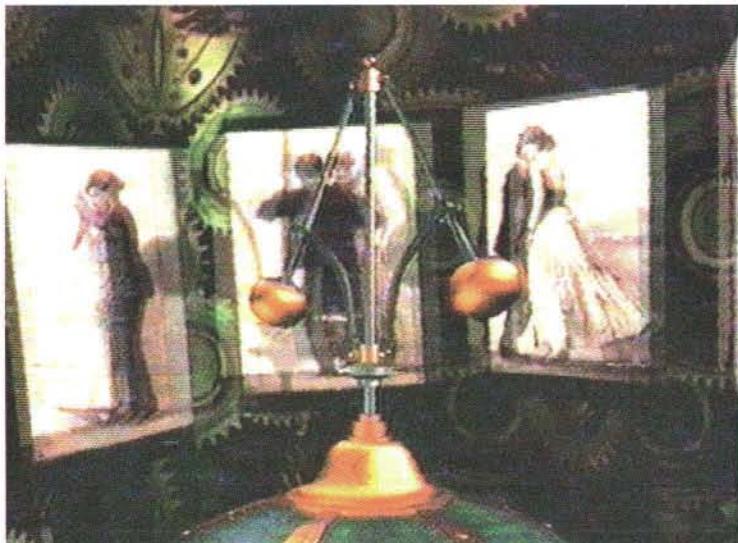
Even with the slight difficulty in getting the clamp device mounted (a snug, slide-on scheme would work better), LaserCue is easily the coolest in-your-face gadgetry accoutrement since the pearl-handled switchblade. And it's sure to have an equal effect on your adversary. —Chris Hudak

LaserCue: US\$159. Lyte Optronics Inc.: (800) 255 9133, +1 (310) 450 8551.

The *Gate to the Mind's Eye* pairs 50 minutes of broadcast-quality computer animation with what is surely the 20th century's most impenetrable plot. Here's how the makers promote their video: "The only way to save mankind is to collapse the entire universe into itself, begin all over again, and witness the rebirth, awakening, and future of the human race." But an equally plausible précis might be "bouncing balls join forces with a metallic tadpole man and take a trip through 32 nightmare future worlds."

During the generous nine-minute credit sequence, we learn that director Michael Boydston has just spliced together animation tapes. With sources as varied as *A Walk in Time through Georgia* (produced for the Fernbank Museum of Natural History, in Atlanta) and *The Fascinating World of Materials* (sponsored by Pohang Iron & Steel Co. of Seoul, Korea), the achievement is that this reediting makes any sense at all.

Some individual sequences are quite brilliant, especially the circular lightning effect by French-based ArSciMed and Yuji Furuta's spinning zoetrope. But as one cyberpunk-tunnel zoom slides into the next, you realize just



Cheers and jeers in equal measure for this reel of recent computer graphics.

how clichéd computer animation has become. Also disappointing are the animators' attempts to model human (and animal) movements accurately. (John Lasseter and the people at Pixar have very little to worry about.)

There may be good technical reasons for the animations' shortcomings, but there is no excuse for Thomas Dolby's throwaway soundtrack featuring notable astrophysicist Fiorella Terenzi's patronizing advice: "Go out to the desert and you might find a piece of a meteoroid or a piece of space." Still, this is easy to solve. Just turn down the volume and create your own ambient soundscape. (I achieved the best results by mixing together The Orb's *Orbus Terrarum* CD and Stephen Hawking's narration from *A Brief History of Time*.)

A modern-day *Fantasia*? Hardly. But *The Gate to the Mind's Eye* gives fair value for a reel of recent computer graphics. Wows and sneers in equal measure. —Kevin Cecil

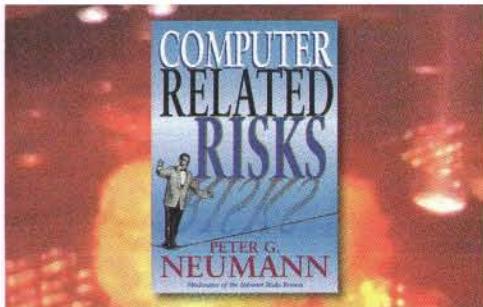
The Gate to the Mind's Eye: US\$19.98, plus \$3.50 shipping. Miramar/BMG Video: (800) 245 6472, +1 (206) 284 4700, fax +1 (206) 286 4433.

Abort, Retry, Fail?

You just can't find a more complete catalog of computer-related catastrophes than in Peter G. Neumann's *Computer Related Risks*. In this book, you'll learn about telephone network and Internet failures, plane crashes, electronic privacy violations, and even the occasional forged e-mail message. Poor technology implementations that can lead to such disasters are more common than you might think.

Some of the problems described arise from human error: Neumann details situations in which typos wrecked a space probe, caused a telephone system to collapse, and blew up a European chemical plant. Other disasters appear to have their roots in faulty hardware. But, in the final analysis, most are the result of fundamental design flaws and accidents just waiting to happen.

Neumann, of course, is the moderator of The Risks Forum Digest, one of the most widely read special-interest groups on the Internet (risks-request@csl.sri.com)



Is your computer network an accident waiting to happen? .com). (See "The Dean of Disaster," *Wired* 1.06, page 42.) In *Computer Related Risks*, Neumann brings the best submissions to the book, organizes them by subject, and tries to analyze the repeated system failures that occur in our technological society.

Where *Computer Related Risks* falls short is in the analysis. Neumann fails to present a comprehensive theory of risks. He also repeats himself: doubtless, he simply didn't have enough time to finish the book and keep up with his duties as a principal scientist at SRI International in Menlo Park, California.

Time pressures, of course, are another risk that can lead to hazardous system failures. Even as it stands, *Computer Related Risks* is a pleasure to read and a must for all who entrusts their lives or livelihoods to a machine.

And that's all of us, isn't it? —Simson L. Garfinkel

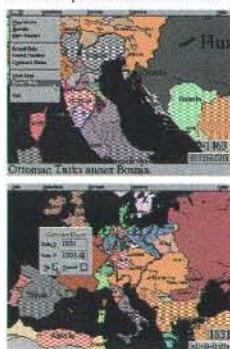
Computer Related Risks, by Peter G. Neumann: US\$24.69. Addison-Wesley Publishing Company: (800) 822 6339, +1 (617) 944 3700, fax +1 (617) 944 8964, e-mail barbarw@aw.com.



Time Trippin'

I've always dreamed of filming an animated map of Europe that would let me watch as the countries rise, grow, shrink, merge, and disappear over the centuries. No need: *Centennia* has put it all on a floppy. I load it and then sit back to watch history unfold from AD 1000 to 1995, all as an animated cartoon.

Want to watch the Evil Empire fall? With a few clicks, zoom to the USSR in 1990. Then, using onscreen buttons as you would on a VCR, move forward, fast or slow, and watch it crumble like a cookie. For a bit of history, I ran the program in reverse and saw the nation shrink still further over the past three centuries.



Bitmapped history.

Gobbling up neighbors appears to have been a Russian pastime since at least the 17th century.

For more in-depth information, you can compare the maps for two different dates and even look up details of countries – events, historical figures, and the history of its people. Headlines or narration can explain what you're seeing; I found them distracting and turned them off.

Maps of Asia, the Americas, and elsewhere are also in the works. – Ivan Berger

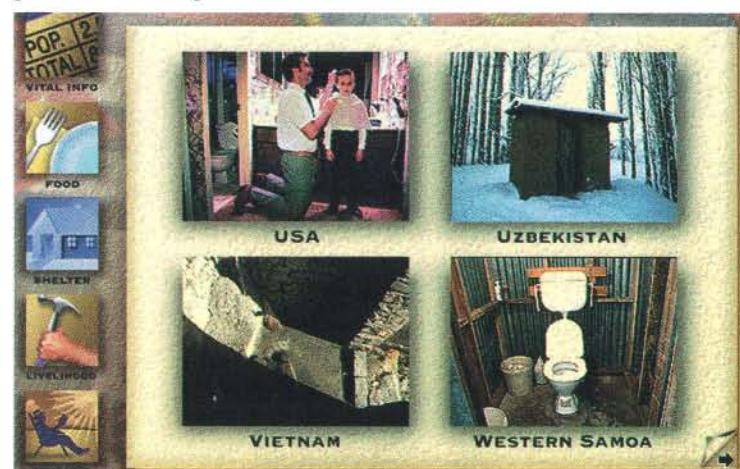
Centennia: US\$89 for DOS, Mac, and Windows; updates: \$10, or free via the Web at <http://www.clockwk.com>. Clockwork Software Inc.: +1 (312) 281 3132.

Living in a Material World

"I have Madonna to thank for this," laughs photojournalist Peter Menzel. Several years ago, after hearing a National Public Radio segment about the bang-up marketing push behind Madonna's book *Sex*, a fed-up Menzel embarked on a project to counter the excesses of the penultimate Material Girl. His pet-peve spawned *Material World: A Global Family Portrait*, a stunning photography book and documentary-style CD-ROM that looks at the homes and lives of statistically "average" families from around the globe.

Using numbers provided by United Nations and regional experts, Menzel and 16 of the world's foremost photographers tracked down families from 30 countries. After a photographer visited for a week, each family and its precious possessions were moved outdoors – onto manicured lawns, alleyways, dirt roads – and photographed.

The portraits are sometimes misleading, but accompanying stats don't deceive. In Western Samoa, for instance, a large, grinning family surrounded by lush papaya and palm trees is a picture of bliss. But the fine print tells me this paradise ranks Number One in the world for teen sui-



Material World looks at loos and average folk from around the globe.

cide. On another page, I find that the handsome people of Bhutan have an average life expectancy of only 49 years for women and 47 for men. And the US is Number One among First World nations in regular church attendance, but Number Three in murder rate! On a lighter note, peeking at a special section on "toilets of the world" erased my embarrassment at occasionally having to tell guests in my home to "jiggle the handle."

The *Material World* CD-ROM brings even greater life to the subject, echoing the book's same breathtaking photography, and adding spectacular video and elegantly integrated sound. StarPress Multimedia deserves praise for producing a CD-ROM that's not only beautiful, but easy to navigate. The groovy soundtrack features authentic native music. And retired CBS news correspondent Charles Kuralt eloquently narrates each section.

Menzel's attempt to document the average has resulted in pure excellence in both book and the CD-ROM. A portion of sale proceeds goes to a scholarship fund established by the photographers to help *Material World's* children. Thanks, Madonna. – Katrina Holden

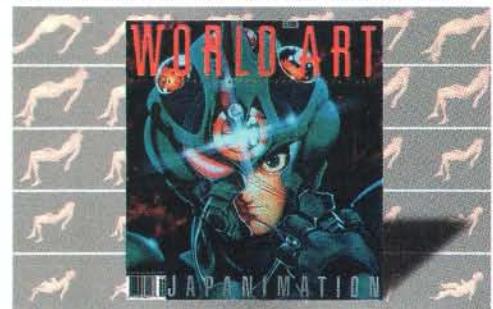
Material World: A Global Family Portrait: US\$30 book; \$39.95 Mac and MPC CD-ROM. Sierra Club Books: +1 (415) 291 1600. StarPress Multimedia: (800) 782 7944.

Art for the 21st Century

Discourse within the art world is too often dominated by brokers, who cater to buyers with scads of cash, and doublespeaking critics, who must work within philosophical systems to justify the artists' work as well as their own careers. But *World Art* magazine, now available in the US, attempts to redress this. Its sophisticated but genial point of view is pertinent to mainstream audiences. Although its trim, square cover resembles that of another prominent art magazine, *World Art* succeeds on levels of readability and practicality where other publications simply baffle.

Art critics and theorists like Jean Baudrillard and the late Clement Greenberg can be wily when left to their own devices, but they come off as much more credible in *World Art's* straightforward interviews. By asking frank questions and forgoing impenetrable artspeak, the magazine's articles end up both intelligent and accessible.

World Art's editorial mission to critique the forces of the international art scene is borne out in inves-



World Art treats digital art and animation with due deference. **tigative and somewhat political articles. Their "Murder, Money and Masterpieces" exposé on the Mafia's deal- ings in art is a piece of detective-style journalism that is alien to cultural publications; I hope to see more like it (though I must admit it lacked the truly seedy punch I'd hoped for).**

Like other art mags, *World Art* is on the hunt for the Next Big Artist, but it also features stories on largely disregarded areas such as Cuba and Ukraine. And, most happily, *World Art* treats the marginalized areas of comic-book and digital art with the deference they deserve.

With this magazine, a gracious amount of aesthetic pleasure is reinfused into a realm rendered dreary by the pundits and polemicists. Its outlook is optimistic and presentation keen; *World Art* appeals to a disenchanted population that has long been told that art is not for it. – Alan E. Rapp

World Art magazine: US\$7. Gordon and Breach Publishing Group: (800) 545 8398, +1 (201) 643 7500 ext. 228, fax +1 (201) 643 7676.

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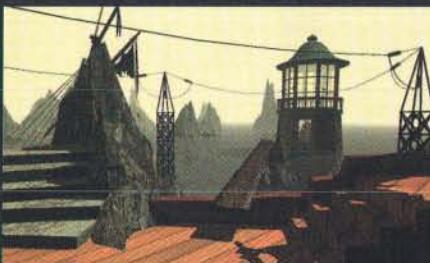
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Earth

Phase 3: Thrones and Dominions

Sub Pop

Access Code 1286

For the past five years, Earth has explored the depths of musical magma bubbling beneath the rocky foundations of heavy-metal guitar. In its past, the band included bassist Joe Preston (once of the Melvins) and Kurt Cobain (until his other band got in the way). On *Thrones and Dominions*, head Earthman Dylan Carlson forges ahead (mostly alone) on his quest for electric-sound redemption, accompanying himself with multiple overdubs of droning and crushing guitar, guitar, guitar. He trades heavy metal's bombast for a lumbering reticence, constructing a crawling, impressionistic thunder out of multi-tracked layers of chords that wander off forever. Oh – and there are even a couple of songs, too.

"Tibetan Quaaludes" makes push-button singsong guitars flow like dribbling metal rivulets: a molten symphony for Glenn Branca to play on the Melvins'.



Saturday-morning cartoon show. "Lullaby" interpolates riffage from the drunken standard "How Dry I Am," pushing it to the sky on a pillow of overdriven current. "Phase 3: Agni Detonating over the Thar Desert..." is an entrancing overkill exercise for heavily flanged guitar – a swirling, blustery excess, ultimately pacific in its reliable, swooping caress. "Harvey," the album's lead track, is a three-minute ditty of almost lyrical proportions, yet it, too, is carried by the subtly shifting undercurrents of multiple guitars.

Each song abruptly lurches into being or closes with an end-of-tape clunk – as if it's only a segment of a larger, ongoing rumble. Earth updates 20th-century minimalism and La Monte Young's Theatre of Eternal Music into a sonic system – one that reflects a postindustrial eternity of higher amplitudes at lower frequencies. Yet, amidst the avant-garde guitar-tooling and sonic heave-ho, this is richly textured music as old as polyphony; "thrones and dominions" of an almost sacred quality. – Patrick Barber ■

18th Dye

Tribute to A Bus

Matador Records

Access Code 1287

I'm on my way home, stuffed into an underground Muni train (part of San Francisco's preposterous idea of accommodating municipal transport). And, yes, it's been a lousy day. I plunk *Tribute to a Bus* into my walkman, push play, and immediately give thanks to a Higher Being. Fuzzy reverb and sonic throes cushion my screeching subway commute, while the minimalist layers, à la Velvet Underground, remind me of a simpler, less cynical period of my life. Plus, I hear this German-Danish trio really rocks live. – Kristy O'Reilly ■



Stereolab

Peng

American/Too Pure

Access Code 1291

Forever in search of an eclectic roster, Rick Rubin's American Recordings presents a domestic re-release of *Peng*, Stereolab's 1991 début. Using guitars and vintage analog synthesizer equipment (in great demand among electronic musicians), Stereolab weaves a musical tapestry that is at times frenetic and poppy, at other times reminiscent of droning '60s psychedelia. Singer Laetitia Sadier alternates between English and French, languid and lovey in both. An excellent opportunity to catch Stereolab in pure, raw form. – Tamara Palmer ■

– Tamara Palmer ■

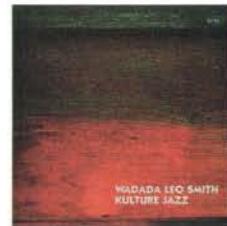
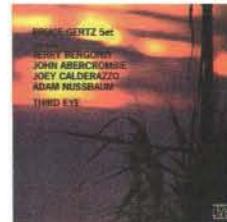
Bruce Gertz Set

Third Eye

Ram Records

Access Code 1288

The free-form element of jazz easily qualifies it as one of the more interactive artistic mediums. Caught direct-to-digital, this live set, led by Boston bassist Bruce Gertz, gives 75 minutes' worth of reasons jazz musicians need an audience to do it right. While Gertz sticks with the upright on all but two cuts, guitarist John Abercrombie adds an electronic edge to what was otherwise a fine night of aggressive acoustic jazz. Emotions run high with Gertz and his band of latter-day minute men. – James Rozzi ■



Wadada Leo Smith

Kulture Jazz

ECM Records

Access Code 1292

Free jazz trumpeter and composer Wadada Leo Smith is a one-man tour de force and musical boat-rocker. Playing a variety of African and Japanese instruments, in addition to trumpet and flugelhorn, Smith offers piercing homages to jazz greats, family, and friends. His references to Haile Selassie prove that a Rasta can play more than reggae, and Smith's unpolished (but convincing) singing, harmonica, koto, and African thumb piano prove that this world-class musician offers more than jazz when he goes solo. – Norman Weinstein ■

Peter Frohmader

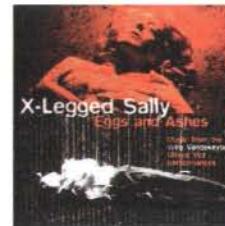
Advanced Alchemy

of Music

Nekropolis

Access Code 1289

Peter Frohmader's music is the aural analog of the nightmarish visions of H. R. Giger (design genius behind the diabolical star of *Alien*). A mixture of visceral power, slabs of industrial sound, prog rock complexities, and a sense of horror make it potent and unforgettable. Frohmader favors swarthy, distorted electric bass and doomy electronics, exploring the slashing of electric guitars and the chiming of an acoustic 12-string. It ain't easy listening, but it demands attention, and delivers. – Dean Suzuki ■



X-Legged Sally

Eggs and Ashes

Sub Rosa

Access Code 1293

X-Legged Sally, a Belgian ensemble comprised of a rock rhythm section (guitar, bass, keyboard, and drums) and a wind section of sax, clarinet, and trumpet, churns out a smokin' mix of avant jazz/rock/funk/madness. The sound melds Frank Zappa, John Zorn, George Clinton, Tower of Power (even Danny Elfman and the Penguin Cafe Orchestra), with such traditional styles as swing, cabaret, and more. X-Legged Sally can groove with the best, careering into left field with aplomb and dramatic verve. – Dean Suzuki ■

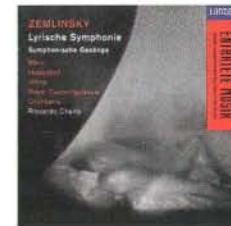
Gene

Olympian

Polydor/A&M

Access Code 1290

The latest in a seemingly endless string of one-word English pop bands with ambitions of conquering America, Gene wears its heart, and Smiths influences, on its collective sleeve. Fronted by the somewhat narcissistic Martin Rossiter, Gene casts a longing, over-the-shoulder glance at the days when melodies ruled and folks really cared about what poor Morrissey was going through. Gene has an impressive gift for writing catchy, sometimes glorious, pop songs that convey that distinctly English desperation. – Robert Levine ■



Alexander Zemlinsky

Lyric Symphony;

Symphonic Songs

Marc, Hagegard, White,

Royal Concertgebouw

Orchestra; Riccardo

Chailly, conductor

London Records

Access Code 1294

A friend and teacher of Schoenberg, Zemlinsky followed the post-Romantic trends of Mahler and Strauss, leaving atonality to his famous pupil. The monumental *Lyric Symphony*, with texts by Bengalese writer Rabindranath Tagore, is a lush, nocturnal evocation of yearning and love. Riccardo Chailly turns in a splendid performance. The *Symphonic Songs*, a setting of seven African-American poems, round out the disc. – Bryan Higgins ■

Microwave o' the Month



Duran Duran

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No, no, double-D, thank you. — Roderick Le Simpson and Eric Taylor Rhodes Cuccurullo Courtemanche

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Code Artist and Title

1286	Earth, <i>Phase 3: Thrones and Dominions</i>
1287	18th Dye, <i>Tribute to a Bus</i>
1288	Bruce Gertz Set, <i>Third Eye</i>
1289	Peter Frohmader, <i>Advanced Alchemy of Music</i>
1290	Gene, <i>Olympian</i>
1291	Stereolab, <i>Peng</i>
1292	Wadada Leo Smith, <i>Kulture Jazz</i>
1293	X-Legged Sally, <i>Eggs and Ashes</i>
1294	Alexander Zemlinsky, <i>Lyric Symphony; Symphonic Sounds</i>

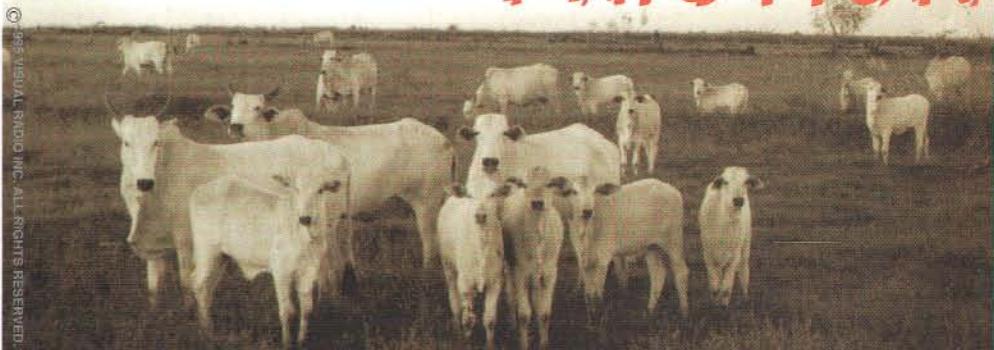
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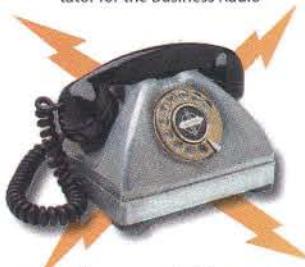
www.visualradio.com/friction



Online On-Ramp

I freely admit it: the first time I used a modem I was terrified. I wanted to stake a claim in cyberspace, but I nearly drove myself to drink just trying to figure out how the silly thing worked. It took a ton of patience from a friend in the know to get me zooming down the information superhighway. I'll never forget the struggle finding that damn on-ramp.

If you had a similar experience and don't wish a friend to follow in your sorry footsteps, I suggest buying him or her *What's a Modem?*, an audiocassette guide to gaining access to the world of online networks and bulletin boards from a Windows terminal. Narrated by John Stewart, computer commentator for the Business Radio



This way to the Net.

Network, this is perhaps the most user-friendly introduction for cybernovices around.

Stewart's narration is folksy and never belittles or confuses the listener. It's as if a beloved uncle stopped by to discuss 9600 baud; his plain-English explanations are much clearer than the technobabble of many how-to books.

What's a Modem? does not recommend where to go online, but does provide a list of free federal BBSes and tips for finding local ones. As a gift or learning guide for the first-time computer user, you simply couldn't ask for better.

- Phil Hall

What's a Modem?: US\$18.95. Audio Computer Information Inc.: (800) 647 8273, +1 (507) 498 3279, e-mail radiojohn@delphi.com.

Spook Space

The National Cryptologic Museum is almost as notable for what it doesn't depict as for what it does. Less than a mile from the National Security Agency in Washington, DC, the museum offers a fascinating but sanitized peek into the NSA's double mission of protecting US military communications while intercepting conversations in the rest of the world.

The museum's small, eclectic collection includes devices such as the Civil War-era "wig-wag" crypto system and Confederate cipher wheels, both used to send secure messages from battlefields; a World War I radio-interception station for listening to behind-the-lines German communications; and a large electromechanical rotor machine built during World War II to decrypt Japanese diplomatic ciphers. A larger exhibit recounts some of the military's most successful cryptographers: Native American "code talkers," whose tribal languages were unintelligible to the enemy.

In the back of the museum is a copy of a 2-foot wooden seal of the United States of America, allegedly carved by Soviet school children and given to US Ambassador Averell Harriman in 1946. The ambassador was so taken with the seal that he hung it in his office; six years later, a routine



From Russia with code: A Soviet electromechanical cipher machine circa 1940.

security sweep discovered a hidden microphone inside the wood that the Soviets had used to eavesdrop on the ambassador's conversations.

But the best exhibit at the museum is the collection of 13 German Enigma machines, the standard military cipher used by Hitler during World War II. Not only do the machines work, but you can use them to encrypt and decode secret messages. To try it yourself, set the code wheels to 10-10-10, type in your message, and watch it translate into an unintelligible jumble of letters. If you were to send this communiqué, your collaborator would simply punch in your secret code to read the message.

So, what's missing? Almost every advance in cryptography since the invention of computers – save an IBM Harvest processor and a Cray supercomputer which faithfully served the code-crackin' NSA from the '60s into the '90s. A secure telephone exhibit is under construction.

But to get the real low-down on the nation's secret ciphers, you'll still have to walk a mile down the road and ask the spooks for a job.

- Simson L. Garfinkel

National Cryptologic Museum: Admission is free. Museum hours: weekdays 9 a.m.–3 p.m., Saturdays: 10 a.m.–2 p.m. National Security Agency: +1 (301) 688 5849.

Are You Feeling Lucky?

You know what lucky is? Lucky is having a pal who's a lot more cultured than your own white-bread ass so you can get hip to a lot of cool stuff without having to spend the time it takes to get that way in the first place. You know who Lucky is? That's Steve Sando – Mr. Lucky himself.

Mr. Lucky is a sophisticated guy in the San Francisco Bay area who lives every hour of his day in pursuit of two things – the heppiest music on the planet and the best booze he can lay his hands on. *MisterLucky* is a zine he publishes every month to hip us all to the latest and finest in suave music and debonair drinks. Apparently, he has no real life to speak of, but that's good for you and me, because by reading his right-on music and hootch reviews, we go straight to being cool and keep a real life to boot.

CDs really took a bite out of musical experimentation for most people. Who wants to take a chance when they cost 17 bucks a pop? That's where *MisterLucky* comes in. Sando flexes his lifetime's worth of record collecting and packs each issue with a good two dozen solid recommendations of what he calls "jazz-centric" music. Jazz-centric covers everything



MisterLucky: The drinking person's guide to fine music.

from early American jazz and bop to classic Brazilian music to blues to Keely Smith to basically everything that's too cool for just anyone to be up on. I know a fair amount about music, but I copped a load of serious CDs from leafing through a few *MisterLucky*s, and so far, I haven't bought one dud on Sando's picks. I'm usually of the view that anyone who calls himself a music critic should be pummeled with a tube sock full of dung, but Sando knows what he's talking about. Thirty bucks for a year of *MisterLucky* is money extremely well spent. And I've got to say, Sando's educated, witty, and downright friendly writing is a welcome relief from the usual bitter-loser-with-a-Kinko's-card mentality most zines seem to suffer from these days.

Written for those who would define the perfect state as "listening to great tunes while expensive and delicious alcohol drifts through your bloodstream," *MisterLucky* is the drinking person's guide to fine music. – Corey Greenberg

MisterLucky: US\$30 per year, \$35 for foreign markets. Coconut Grove: +1 (415) 648 5803, fax +1 (415) 282 4394, e-mail coconutg@wco.com.

Medieval Fever Dream

Ecstatica is a panic. From the moment you enter the game's tiny medieval town of Tirich, you're under attack. Even the more benign inhabitants – rats, snakes, and crawling wounded – follow you relentlessly. By the time you master the keypad controls, you will have suffered numerous indignities – but it's a fairly enjoyable way of coming to terms with the inevitability of death. And once the adrenaline settles, you'll be well on your way to rescuing Tirich from its curse. It seems that the wizard's maid went messing with a book of magic and ended up trapping the town in her demonic dreams.

Ecstatica's more twisted aspects are not immediately apparent; the strangest



Twisted at heart.

scenes are deep inside. The setting is familiar – dragons, minotaurs, and wizards. But the vivid "ellipsoid" graphics give new edge to the sword and sorcery, lending characters more natural appearances and movements. Full of macabre touches, ominous music, and lurid as a child's nightmare, *Ecstatica* manages to be not only funny ha-ha, but funny weird.

Small-scale but well-proportioned, *Ecstatica* was developed by Andrew Spencer, and bears the hallmark of a finely warped mind rather than a production line – more evidence that the best bizarre computer products are the result of traditional authorship. – Marc Laidlaw

Ecstatica, DOS CD-ROM: US\$59.99. Psygnosis: +1 (617) 497 7794, e-mail psygtech@psygnosis.com.

READ ME On the bookshelves of the digerati

VINTON CERF helped create the Internet a quarter-century ago. Now he is president of the Internet Society and senior vice president of data architecture at MCI. (See "The Creators," *Wired* 2.12, page 152.)

Men Are from Mars, Women Are from Venus by John Gray. "Although my wife says it's written from a male point of view, it has helped me put some puzzling interactions into perspective."

The Internet Book by Douglas Comer. "I always pick up the latest Net, Web, and Gopher books to see what's being published. Comer is a reliable author who's been involved in the Net community for a long time." "I also read a lot of science fiction; I just re-read David Brin's *Earth*, Robert Forward's *Time Master*, and Isaac Asimov's *Robots of Dawn*."

A veteran of MTV and Nickelodeon, **MICHELE DiLORENZO** is the president of Viacom New Media. The two-and-a-half-year-old company has 18 interactive entertainment titles on the market, including two bestselling CD-ROMs, Nickelodeon Director's Lab and MTV's Club Dead.

A Harlot High and Low by Jean Louis Guez de Balzac. "I was inspired to read Balzac after I visited Paris."

The Shipping News by Annie Proulx. "This was a change of pace from what I had been reading. I loved the quirky characters and the humor."

The House of Mirth by Edith Wharton. "I recently went through an Edith Wharton phase, reading *The Age of Innocence* and *The House of Mirth* back-to-back. These two books span her career, so it was interesting to see how her style developed, became more economical. Her writing is some of the most beautiful I have ever read."



From left: Vinton Cerf, Michele DiLorenzo, Stacey Horn, Kai Krause.

STACEY HORN is the madam of Echo, the popular New York-based electronic salon. An avid reader since 14, she is working on her first novel. (See "Net Living: The East Coast Hang Out," *Wired* 1.3, page 27.)

Midnight in the Garden of Good and Evil by John Berendt. "I didn't get any work done the weekend I read it. And I kept thinking, That's it. I can't write, I give up. I'll leave it to Berendt and stick to Echo."

Confessions of a Mask by Yukio Mishima. "This is not the lovely, twisted, painful stuff I expect from Mishima. I didn't finish it, I admit."

A Sense of Reality by Graham Greene. "I read this book every year."

Forever Barbie: An Unauthorized Biography of a Real Doll by M. G. Lord. "A must-read for all gurlz and boyz. So, so smart. And funny. To M. G. Lord: I tortured my Barbies – What does this mean?"

Graphic god **KAI KRAUSE** is worshipped by Photoshop users far and near for his add-on program, *Kai's Power Tools*. This summer he releases *Vector Effects*, a similar extension package for Illustrator and Freehand.

"I'm getting back to books I was given a few years ago that include a set of **Albert Einstein's Letters** in German. He received mail from all over the world from a wide variety of people – kids and scientists, politicians and family. His responses are always charming and often surprising – he once advised a child to skip school to pursue his hobby."

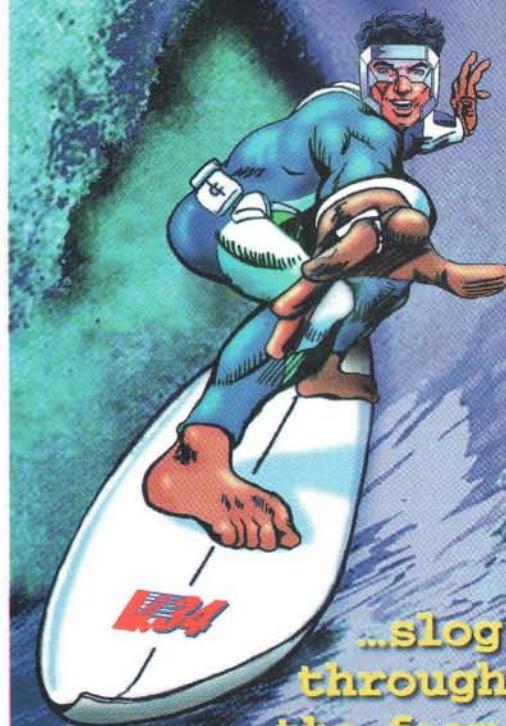
Style books on Tuscany since I have a new house to furnish in Montecito, California. And an avalanche of **bedtime stories for 6-year-olds**."

Douglas Hofstadter's Fluid Concepts and Creative Analogies, which I got for my birthday, is also very interesting. One of my all-time faves is his *Gödel, Escher, Bach*."

Baudman says...

Surf the Net at 28.8

or...

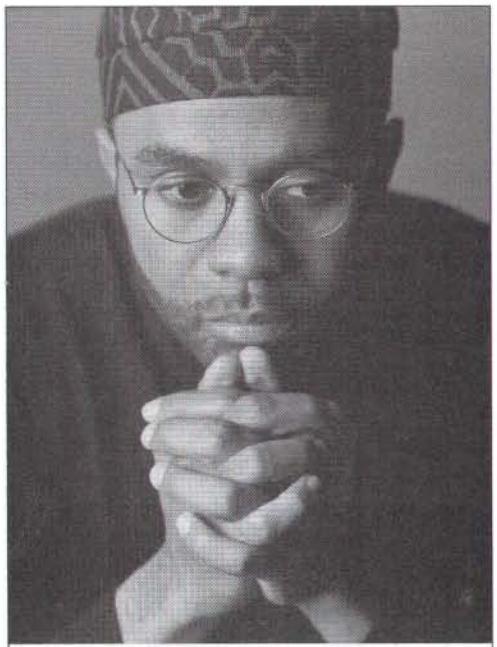


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—ROBIN TOLLESON, DOWNBEAT

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1. Neo-Luddism

Resisting technology in the face of an overwhelming digital revolution may be noble, but it sure seems futile. Even the most eloquent Neo-Luddites – from Sven Birkerts to Theodore Roszak – admit their attitudes are quixotic. It's this rhetorical tactic that makes them hard to assail. How can you contend with someone who agrees that his or her position is hopeless from the start? But, finally, this acquiescence makes their arguments irrelevant. In fact, I have a sneaking suspicion that the real Neo-Luddites are engineers working undercover in Silicon Valley. How else can you explain the constant stream of bug-ridden and hard-to-use products being released?

2. Net Security

I always assumed that as the Net became more commonplace and as the electronic frontier became the electronic office, media hype about hackers would disappear. Hackers would be no more intriguing than teenage shoplifters. Yet, despite the media's increasing Net savvy, hackers remain front-page material. The public's fascination with hackers doesn't seem to stem from a prurient interest in the forbidden, but from sheer awe of people who travel freely and effortlessly in the digital realm. Hackers are 20th-century mystics, capable of understanding and manipulating a secret world that confounds the rest of us.

	Current Position	Position Last Month	Months on List
Neo-Luddism	1	5	2
Net Security	2	1	2
Direct-Broadcast Satellites	3	–	1
Microsoft Network	4	–	1
Multiuser Games	5	–	1



3. Direct-Broadcast Satellites

It's the revenge of the airwaves. Just as broadcast television watched its viewers get snatched away by cable TV, now the cable industry is facing competition from sophisticated DBS systems. These new satellite systems can beam 150 channels of digital TV into unobtrusive 18-inch dishes at monthly rates well below cable charges. While most cable executives are still in shock (or denial), the more intelligent among them are beefing up infrastructure investments. Cable's key advantage over DBS is its return path from the home – a critical feature for true interactive media and the infobahn.

4. The Microsoft Network

The imminent launch of the Microsoft Network has the Internet community mesmerized. Every Microsoft announcement is microscopically analyzed for hints of what's to come. There is no doubt that the network will profoundly change the culture of the Net, but the changes will have less to do with Microsoft policy on, say, acceptable content than with the underlying technology. The Net is closely related to Unix, and the two share similar characteristics: both are hard to use, buggy, and insecure. But they are also easy to change, flexible, and egalitarian – traits that have nourished the Net community. The question now is, What sort of culture will Microsoft promote?

5. Multiuser Games

William Gibson came up with the notion of cyberspace while watching teenagers mesmerized by the flickering displays of videogames. It's an image that seems increasingly prescient. From CompuServe's *WorldsAway* to id Software's *Quake*, there has been a spate of recent announcements about online multiuser games. These systems will act as electronic theme parks that allow players across the country to interact within a graphical world. The prospect of a visually richer online world is enticing and seems likely to catch on quickly, first for games and then for more sober business applications. Yet there is something repellent about the thought of working in a world designed by Nintendo.

—Steve G. Steinberg (hype-list@wired.com)

Join the Circus

Circus! is a graceful and amusing CD-ROM simulation of an intimate one-ring circus that feels like a TV cartoon under your control.

Aided by an appealing ringmaster mouse named Zippy, children (ages 3 and up) can pick from eight animated circus acts in the Main Tent. A dress-up parade and the trapeze seem to appeal to children who like fantasy and role-playing, while the human cannonball and lion acts draw those who enjoy making judgments about spatial relationships and playing in competition.

It's easy to make trapeze artists miss each other in midair or accidentally shoot cannonball clowns out of the tent. But if a child doesn't fully figure out an act, he or she never truly gets stuck – after a



Leapin' lions!

while, the routine gently concludes.

A separate environment, the Music Tent, offers interactive music numbers that succeed in their own simple way, better than most interactive music CD-ROMs for adults. And a clever mouse-hole whisks you from place to place so you never have to laboriously retrace your steps.

Traditional animation techniques and character voices by Ayshe Farman-Farmaian and team are superb, but the original songs may echo through your head for longer than you'd wish. *Circus!* offers a gentle alternative to the obsessive level-hopping that dominates interactive games for children. —Jim Gasperini

Circus!: US\$39.95, Mac and PC. Voyager: (800) 446 2001, +1 (212) 431 5199.

For Those Dressed in Black

Faceless Ftp

I've always told my friends that in the future, the connection between my hard drive and the Internet would become transparent. Data would be so accessible on the global network, any tidbit would be just a click away.

Web browsers come close to this ideal – only you can't send files and information with them. Snatcher comes even closer. In theory, it's an ftp client for the Mac. In reality, it's so easy to use, I hardly know it's there.

The program takes the Mac desktop metaphor and applies it to the once-complex task of transferring files on the Net. Type in an address, and Snatcher's files and folders pop up in a window. Drag a



Command line ditcher!

file to your desktop and – presto! – You've started a file transfer. Send it to the background and keep working, or queue up other files.

You can finally get rid of that long list of arcane ftp addresses you've been maintaining by making an alias and saving it to your hard drive. I've saved all my friends' and co-workers' public directories; now, sending them files is as easy as dragging and dropping. At last, the command line is ancient history.

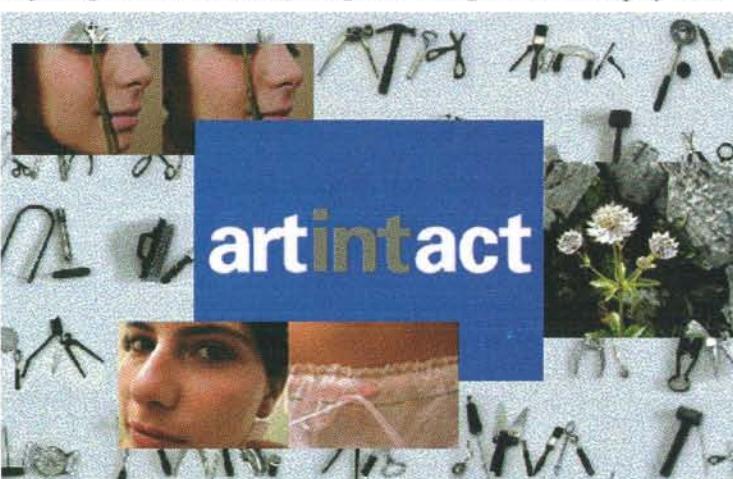
– Jeffrey Veen

Snatcher: US\$49.95. Software Ventures Corporation: (800) 782 9333, +1 (510) 644 3232, e-mail: snatcher-info@svcdudes.com, via the Web <http://www.svcdudes.com>.

Here, finally, is something to show sophisticated friends when they sniff, "When will there be something intelligent on CD-ROM?" Three artists' interactive work appear in *artintact 1*, the first issue of *Artists' Interactive CD ROMagazine* from ZKM, a multifaceted institute in Karlsruhe, Germany, that has ambitions to be the Bauhaus of the digital age.

Simplest in structure is "Manuscript" by Eric Lanz. What at first look like hieroglyphs become, on closer inspection, rows of tools – from salad forks to industrial saws to toilet plungers. The minimalist structure is an ironic commentary on taxonomic categorizations. Click on each tool and start a short video showing it in action. What's that? Oh, a ring sizer. The guessing game is surprisingly engaging, but ultimately a bit thin.

More complex is "The Exquisite Mechanism of Shivers" by American artist Bill Seaman. Thirty-three sentences are broken into remixable groups of phrases, so you can produce absurdly poetic lines like "An ephemeral certainty triggers an enigmatic arrangement to escape the changing ramifications of a resonant desire." Videoclips associated with each phrase (panning landscapes, close-ups of machinery) allow sentences to be played as movies. There is an unfortunate pause between clips on generated sentences, though the 33 original sentences play more



Interactive media for when the downtown crowd comes to visit.

smoothly. The curious associations produced by jumbling video, sound, and text create an endless multimedia update of the Dadaist game "Exquisite Corpse."

Most elaborate is French artist Jean-Louis Boissier's "Flora Petrinularis," based on Jean-Jacques Rousseau's homonymous book about flowers and his famous *Confessions*. Rousseau's memories of 16 amorous encounters are dramatized in pairs of short looping video animations, mainly voyeuristic close-ups of fetish objects (a bit of lace slipping off a breast, a pink sash coming untied) and faces (a tear running down a cheek, a seductive off-shoulder glance). Sixteen varieties of flowers get parallel treatment. Often, the paired clips show the same scene with a slight gap in time, to uncanny effect.

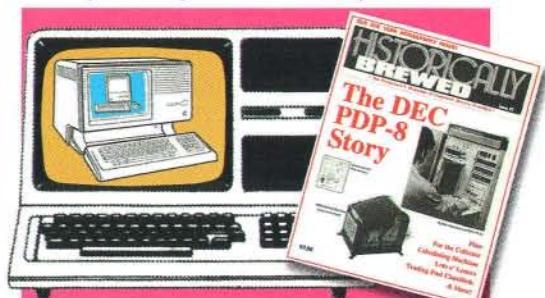
The disc comes embedded in a handsomely designed book containing learned commentary on the works in English and German. These three pieces, which all began as installations, have been reworked into delicate little gems. Such intellectual meditations on the nature of seeing and interactivity won't be to everyone's taste, but at least you'll have something to show when the downtown crowd comes to visit. – Jim Gasperini

artintact 1: US\$49.95 Mac CD-ROM. US distributor: D.A.P.: (800) 338 2665, +1 (212) 473 5119.

Calculating Nostalgia

When my mother phoned last summer to remind me that the family yard sale was approaching, I knew what she was after. She wanted my Commodore 128. I swallowed hard. My 128 had helped me create extra-wide margins on more term papers than I could count, and my brother and I cemented our relationship playing *Blue Max* and *4th and Inches*. No matter. After much gnashing of teeth, my mother declared that I was too sentimental and sold the machine for 50 bucks. So, when I stumbled across the zine *Historically Brewed* a few months later, I could relate to its devotion to outdated technology.

Historically Brewed caters to serious collectors of displaced workstations and microcomputers, appealing to both the geek and the pack rat in us all. Although its prose does get a bit thick with data and dimensions, it provides a refreshing change to the constant prattle about upgrades in other computer mags. An article in Issue 7 details the rise (the fall comes in a later installment) of Digital Equipment Corporation's Programmed Data Processor (PDP-8), an early minicomputer deemed wildly successful



For collectors of displaced workstations and microcomputers. after Digital sold 1,200 of them during the late '60s. Then came the PDP-8/S, the first cash-and-carry desktop computer, which spawned clones galore and eventually led to the PC revolution.

What saves *Historically Brewed* from being just another boring computer-history journal is its audience. The letters page is a great read, if only because it's nice to know there are others – in this case, college professors and retired technicians – who believe that the sum of a computer is greater than 0 and 1. There's the usual feisty but good-natured dissent as well. One reader argues that the Macintosh Model 0001 (available for US\$500 in the *Trading Post*) pushed "interface fascism" because it didn't have cursor keys, forcing you to handle the mouse; another relates that many reporters at small Kentucky newspapers still swear by their Tandy 100s, forcing newsrooms to use only 300-baud modems as a result.

And my mother thought I was too sentimental!
– Chip Rowe

Historically Brewed: US\$3 an issue, or \$18 for six bimonthly issues. +1 (904) 384 7163, e-mail: historical@aol.com.



Straight outta the Jungle

Beaming onto television screens across the land is *Phantom 2040*, a wild futuristic twist on the original Lee Falk comic that has been running in newspapers for more than 50 years. Masquerading as just another laser-shootin', Spandex-sportin', superhero cartoon, *2040* is a brilliant animated rendition of a futuristic dystopia.

Taking the classic hero from his jungle roots and throwing him into the future, the story arc has 18-year-old biology student Kit Walker Jr. stepping into his dead father's shoes and fulfilling the family destiny by becoming the 24th Phantom. Yet unlike the Phantom of old, a warrior in the heart of



A wild, wicked future.

The African jungle, this Phantom's battle is to preserve biological diversity and stop the growth of Cyberville, pet project of evil corporate overlord Maximum Inc.

With hip references to cyberspace and virtual reality, and a clever mix of biology and technology, *2040* presents a convincing version of a world in which natural resources have lost out to technology. Not simply another merchandising scam, *2040* is spectacularly written with smart dialog, an intricate story line, and animation to match.

- Todd Krieger

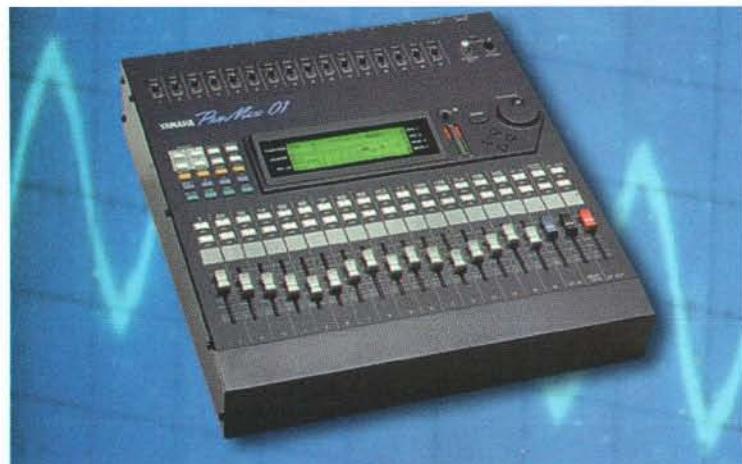
Phantom 2040: Half-hour series produced by Hearst Entertainment Inc. Check your local listings.

Sir Mix-a-Lot

Most musicians nowadays are gearheads. Caught between hype and hope, they continue the hunt for that elusive piece of equipment that, manufacturers insist, will make their sound cooler and their demo tapes irresistible. While no piece of gear will ever win the creatively challenged million-dollar record deals, Yamaha's ProMix 01 is one of the most useful music tools since four-track analog recorders. If you've got the ideas and roughly 2,000 bucks, no other mixer will get your music to disk or tape – or to the house PA system – with so much value and convenience.

First, value. This 16-channel machine (plus an additional stereo input) comes with three stereo-dynamics processors for applications like compressing, gating, limiting, and ducking. Musicians will delight to find there are also two internal stereo multieffects processors for a variety of delightful reverbs, echoes, pitch shifting, and chorusing effects. Having internal effects and gates means that your audio data stays in the digital realm, and that patching is a breeze.

Second, convenience. The ProMix has motorized faders that allow for



Calling all wanna-be rock stars; Yamaha's got yer ticket!

automated mixing. You can store your fader positions and effects settings into "mix scenes," making mixing simpler and more precise. Anyone who's ever tried to do a complicated mix with just two hands can now put them together and clap enthusiastically; automated mixing used to be a feature found only on consoles many times the ProMix's price.

Want more, gear nut? Get this. Fully parametric 3-band equalizer Phantom power. Four auxiliary sends; two for internal use, two for external. A digital two-track out. Full MIDI control.

So, no gripes, right? Not so fast. The headphone jack is in a truly asinine, hard-to-reach place. The unit stank up my home studio for a couple of weeks with a foul, synthetic smell. And the rack ears for the machine are optional and difficult to find.

Still, this is a sweet deal. With prices dropping for hard-disk-based recording systems and modular, digital eight-tracks, the gap between home recording and the professional studio – once the size of the Grand Canyon – will soon be measured in mere inches. – Rogier van Bakel

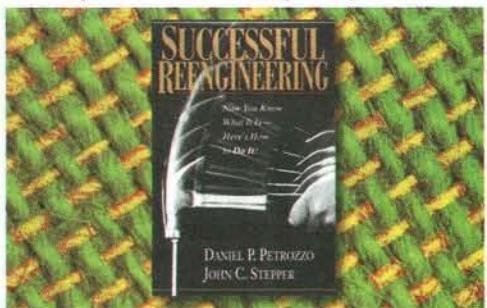
Yamaha ProMix 01: US\$1,999. Yamaha Pro Audio: +1 (714) 522 9011.

12-Step Reengineering

The widespread practice of reengineering long-established business processes from scratch, usually with the aid of information technology, has probably wrecked more lives than any business fashion since the reign of the numbers-oriented financial whiz-kids of the '80s. Even reengineering's best-known prophets will remind you that most reengineering projects fail. One problem is that these prophets have offered little concrete guidance for would-be reengineers. Daniel Petrozzo and John Stepper's *Successful Reengineering* promises to change this by providing step-by-step instructions.

Most people will find this book useful only as a cultural artifact from the strange world of industrial automation. It presumes that you're up-to-date on the jargon and debates of that world, and it makes no pretense of drawing the stuff together in a coherent conceptual framework.

What the authors do provide is a batch of small details that nobody could make up without having been there, such as the danger of conflict among partisans of various software-development tools. They also insist that every reengineering team needs a public relations manager to spread the



Successful Reengineering: Small steps, no leaps.

gospel and quell dissent.

Yet beneath this, Petrozzo and Stepper's book shows that the whole idea of reengineering is not a new one. Core ideas for mapping and redesigning work processes are essentially what systems analysts started doing decades ago: treating organizations as assembly lines, people as component parts of a machine, and themselves as the minds behind the One Best Way to arrange work organizations. Their methods presume that we live in a wired world where everyone has a computer and access to the Net, but they exhibit no concept of the power of putting people online.

The world presented by Petrozzo and Stepper has little room for change, little use for empowerment, and little respect for the capacity of intelligent people to organize their work for themselves. We can do better than that, and we can do it without the mayhem that reengineering so routinely brings to people's lives. – Phil Agre

Successful Reengineering, by Daniel P. Petrozzo and John C. Stepper: US\$24.95 hardcover. Van Nostrand Reinhold: (800) 842 3636, +1 (606) 525 6600.

Street Cred Contributors

Phil Agre teaches communication at the University of California, San Diego, and edits *The Network Observer* at <http://communication.ucsd.edu/page/tno.html>.

Patrick Barber (apraxia@apraxia.seanet.com) saw *Weird Al Yankovic* in a Taco Bell in Mount Vernon, Vermont. He (Patrick) is a writer.

Ivan Berger, technical editor of *Audio Magazine*, has been writing about audio and other aspects of electronics since 1962. As an Altair owner in 1976, he was one of the first with a home computer.

Kevin Cecil co-wrote the award-winning multimedia CD-ROM *Kiss and Make Up* and is working on the BBC's first cyberpunk comedy show for children.

Arthur C. Clarke is the author of *2001: A Space Odyssey* and the inventor of the communications satellite. Now in retreat in Sri Lanka, he ponders the mysteries of this – and other – worlds.

Brian Eno lives in London and is a patron of War Child, an organization working with traumatized children in former Yugoslavia.

Simson L. Garfinkel (simsong@mit.edu) writes about science and technology from his electronic house in Cambridgeport, Massachusetts. These days, he's trying to make a living from hating Unix.

Jim Gasperini (jimg@well.com) is collaborating with Tennessee Dixon on *Scrutiny in the Great Round*, a CD-ROM work of art about sex and procreation.

Corey Greenberg is technical editor of *Home Theater Technology* magazine. He has not a single kind bone in his body, yet all the ladies call him "Loving Daddy."

Phil Hall is a New York-based writer and film scholar whose work has appeared in numerous American and British publications.

Bryan Higgins (bryan@well.com) plays the French horn and clavichord, writes fiction and software, and lives in Berkeley and Soda Springs, California.

Katrina Holden writes cool children's books and TV stuff in LA.

Chris Hudak (gametheory@aol.com) Fiction/tech/travel writer. Long hair. Shoots pool. Borderline alcoholic. Attitude out to here. Lucky as hell. Likes Wile E. Coyote, Disneyland, and Death.

Todd Krieger (tkrieg@sirius.com) is a reluctant nomad in search of the perfect chili dog.

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Alan E. Rapp (rappa@sfgate.com) works in the San Francisco book publishing industry. He likes to watch Russian science fiction films until he's reduced to psychic rubble.

Chip Rowe (chip@playboy.com) is an assistant editor at *Playboy* magazine and chief honcho of *Chip's Closet Cleaner*.

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Dean Suzuki, PhD is a professor of music history specializing in experimental music at San Francisco State University. He is also a radio host and is writing a book on the evolution of minimal music.

Scott Taves (staves@interaccess.com) is the manager of B&W Music and The Blue Room record labels in the US. He's partial to machine music and apocalyptic, carnage-filled videogames.

Rogier van Bakel (rogierml@aol.com), as anagram enthusiasts will note, has Brave Ink Galore. He is a Dutch correspondent in Sharon, Connecticut.

Norman Weinstein is a poet and music critic whose most recent book is *A Night in Tunisia: Imaginings of Africa in Jazz* published by Limelight Editions.

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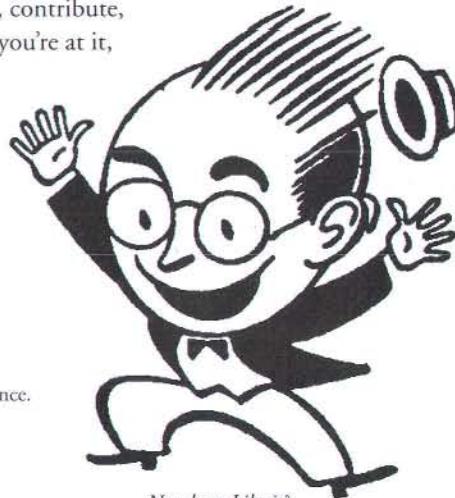
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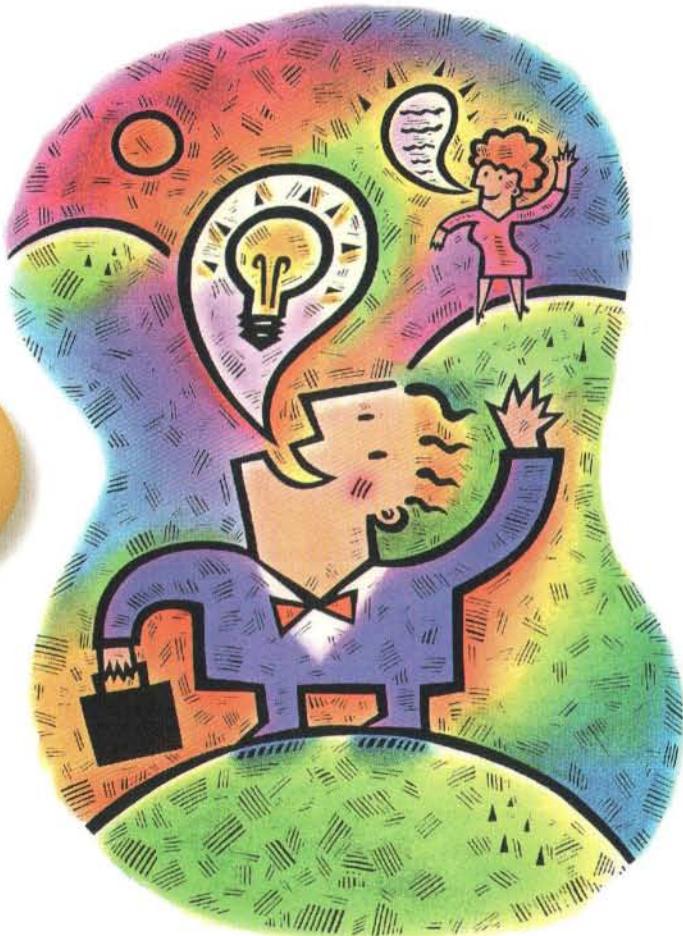
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net surf

Edited by Kristin Spence

Internet Public Library: Way Past Due

Granted, the Net houses far more information than the TB Blackstone Memorial Library on Chicago's South Side ever could. But Blackstone had something the Net still does not — Mrs. Hawthorne, Blackstone's former librarian. A plump, stern woman, Mrs. Hawthorne spent much of her day shushing noisy kids or exiling boisterous bullies to remote corners of the reading room. But when it came to reference material, if I needed to find anything, I'd corner her. Within minutes, the book would be in my hands.

Mrs. Hawthorne retired last year, and I miss her, especially after fruitless hours of online fact hunting. Seems the Net has it backward: go online, and you can make all the noise you want, but it's almost impossible to find anything.

You can imagine my reaction when I heard about the *Internet Public Library*. It sounded like the answer to all my researching prayers. Who could resist the promise of an online reference desk? The instructions invited me to leave a question and assured me that a trained professional would e-mail me a partial answer, along with pointers to even more details. I instantly memorized the URL.

The system worked, though not very quickly. It took two days to get a full explanation of the differences between RISC and CISC processors, so it's likely the library won't be much use in settling barroom arguments. At least not until they get a lot more librarians. Right now, the reference desk is covered by 35 students at the University of Michigan School of Information and Library Studies — a pittance compared with the droves of online info-hounds.

The Internet Library was dreamed up by Assistant Professor Joseph Janes in a moment of desperation. "I was scheduled to teach a seminar on the impact of technology, which I'd taught twice before. I wasn't sure I could face it again," Janes recalls. To stave off death by ennui, Janes proposed the Internet Public Library as a class project. Fifty-five students applied — far more than he'd expected.

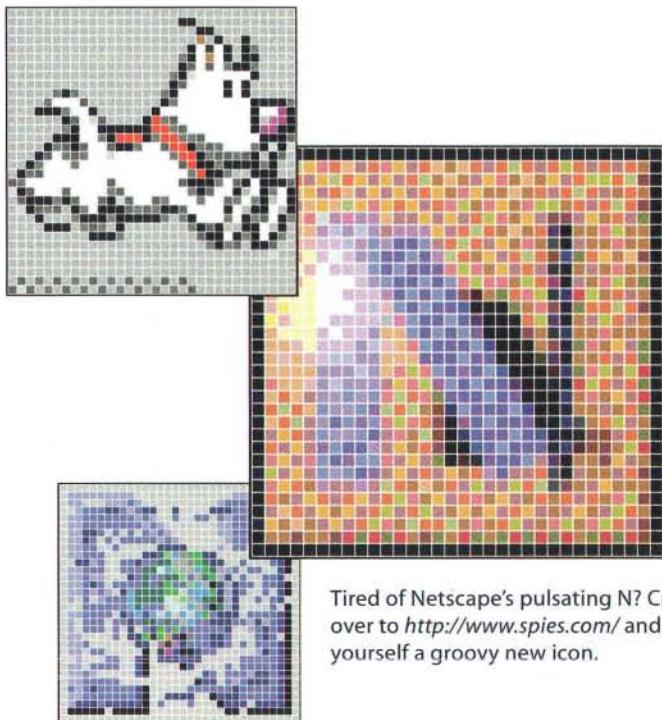
"At the beginning, I always felt the IPL was some kind of Judy Garland/Mickey Rooney movie — 'Hey, let's put on a library! I've got some costumes in the barn!'"

The library home page took about 26,000 hits in its first two weeks, mostly from visitors to the reference desk. But, says Janes, it's just a matter of time before net-surfing parents discover the library's youth division. There, you can download entire children's books, complete with original illustrations and audio narration.

As a student-run operation, online library's well-being is at the mercy of graduations and summer breaks. So, Janes is trolling for sponsors to fund the library permanently. But Macphile Janes won't take just anybody's money. "I don't want to become the Microsoft Internet Public Library," he said. "But I could live with being the Apple Internet Public Library."

To speed up service and beef up staff, Janes is also looking for volunteer librarians willing to work the reference desk. About 60 have responded thus far, some from locales as far away as Australia. (Alas, still no word from Mrs. Hawthorne.)

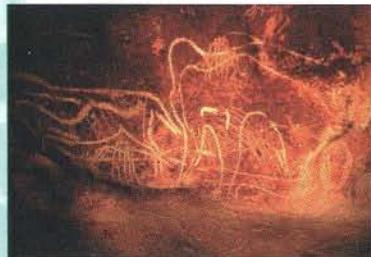
Web reference hounds should point their browsers to <http://ipl.sils.umich.edu>. Those without browse capability can send e-mail to ipl@umich.edu. No cards required. — Hiawatha Bray (72662.2521@compuserve.com)



Tired of Netscape's pulsating N? Cruise over to <http://www.spies.com/> and get yourself a groovy new icon.

Evolution, Revolution, Devolution

A conceptual offering of philosophic technoshamanism, the site known as *The Deoxyribonucleic Hyperdimension* is the last word on evolutionary ideas and knowledge. In cyberneuro reflections of visible language and virtual reality, the glittering Web strands of Hyperdimension resonate with octaves of energy approaching satori. *Terence McKenna Land, Gaian Cybernetica*, and, our favorite, *It's Time to Mutate*, are among the many interconnections of this global telepathy rave. Have a hyperdimensional mind meld at <http://www.intac.com/~dimitri/dh/deoxy.html> and engage in the revolution of the human being.



When old meets new: Witness newly discovered French cave paintings at <http://www.culture.fr/gvpda-en.htm>.

Multimedia Mecca

Sure, it's a blatant product promotion, but the new Apple Computer Web site, *Quicktime Continuum*, is a worthy Web shore regardless. In support of Quicktime technology for Mac and Windows, Continuum's banks hold a brimming stream of resources: sample code, Quicktime architecture, and codecs are among the topics discussed, while a press-release index and the latest news on Quicktime VR is a tantalizing source of pleasure for any multimedia junkie. The movie-and-music archive highlights everything from Ray Lynch to REM, and a multitude of links to other Quicktime sites heightens the rush. Get lost in the continuum at <http://quicktime.apple.com/>.

Surfin' 6 Feet Under

We've all gotta go sometime, so when you're ready to meet that Big Kahuna in the sky, why not turn to the friendly folks at the *Carlos A. Howard Funeral Home Page*? Their motto is "The Priority of People Taking Priority over Profit," and the staff at Carlos Howard really does care. With a colorful online catalog of products and services, planning for the dirt nap is now faster, easier, and more fun than ever! No more



Red, Red Wine

Incessant rains and subsequent flooding have put a big damper on many a Californian's travel plans to the Napa and Sonoma vineyards this year. But parched and sullen surfers will find a buttery oasis at Master Sommelier Peter Granoff's *Virtual Vineyards*, a treasure-trove of fine wine and bubbly selections. When Peter's not recommending wines to his thirsty diners at Square One in San Francisco, he's tasting fine vintages from around the world and expressing his verdicts on *Virtual Vineyards*. His choice picks – many from small, lesser-known vintners – are handily accompanied by a comparison tasting chart of each wine's characteristics (flavor, body, acidity, tannin, oak, complexity, and level of dryness or sweetness), as well as recommended food pairings. For a real taste, give him your credit-card number, and you can even have a bottle delivered to your doorstep (via snail mail, of course). If you're in a pinch for the perfect chardonnay to take to that weenie roast, turn a bottle at <http://www.virtualvin.com>. Chin chin!

need to deal with the smarmy condolences of a jaded, real-life undertaker. With Carlos Howard, funeral arrangements are a simple point 'n' click away.

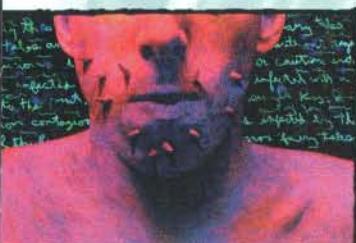
Check out the Mediterranean Oak casket with a tasteful light pecan finish, a steal at only US\$1,695. With its safety bottom and fail-safe liner, this baby is built to last. For

those of you on smaller eternity budgets, the Misty Rose 20-gauge steel model runs a modest \$794 (and can probably stave off decomposition for a while, too). Now that's true value! Or, if you really want to go under in style, try the gorgeous Montrachet Mahogany number at a cool \$4,100. Its adjustable bed and mattress guarantee you the deepest sleep you've ever had.

The Carlos A. Howard Funeral Home Page is a great quick browse for morbidly curious looky-loos, or, if the Reaper's been scratchin' at your door, just click the onscreen "order" button and have product shipped right to your home. What could be more convenient? Make like Dracula at dawn at http://www.melanet.com/shops/Carlos_A_Howard_Funeral_Home/.

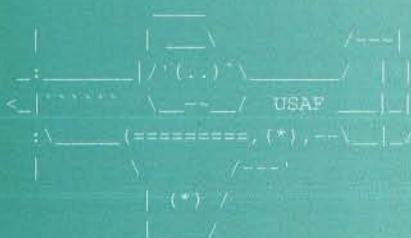
Win Friends and Be Popular. Sorta.

Do you go to cocktail parties and have nothing interesting to say? Do you frequent the punch bowl, or hover over the deviled eggs



beautiful smattering of artwork being shown at cyber gallery <http://gertrude.art.uiuc.edu/@art/gallery.html>.

because you're clueless about the Internet (that hipper-than-hip topic of conversation)? Well, you too can sound cool, win friends, and be the star of the party with *WEBster*, Tabor Griffin Communications's e-zine, (e-mail magazine, in this case). Get clued on the latest cyber wheelings and dealings; which online service is being bought out, and by whom. Forget the days when you thought a SLIP was something Freud invented. Now you can retrieve articles on the latest Web software and hardware, and speak intelligently about them once you've downloaded the intel to your own neural net. For more information, send an e-mail to 4free@webster.tgc.com, and go confidently into that good night.



P-51 - from Frederic Danna (danna@irisa.fr)

Flux Fatale

One of the great things about the Web is that it allows you to check up on old friends – even the occasional antiheroine or two. Dash to <http://www.expanse.com/aflux/index.html> and catch up with the angular, amoral Aeon Flux, star of many a *Liquid Television* MTV short. Her cyber hide-out offers character sketches, interviews, and news about the next series coming this fall.

Another interesting inclusion is the original Aeon Flux plot synopsis, as pitched to MTV by its creator Peter Chung, which pushes Hollywood action-film conventions back

at us "in the form of absurd heroic entertainment." (And you thought Batman was a problematic superhero....)

Related links devout Fluxers will covet include one about French painter Egon

Schiele, whose lithe, agonizing figures inspired Chung's animation style. *Parlez-vous animé?* You will after visiting <http://www.labri.u-bordeaux.fr/~goudal/Musee/Schiele/Schiele.html> or <http://sunsite.unc.edu/louvre/paint/auth/schiele/>.

Amping up the Angstroms

Are the hours you spend in front of the monitor causing anxiety in your love life? Your social life? Are you questioning the troubling nature of existence itself? Judging by the postings on the Usenet newsgroup *alt.angst*, you're not alone.

Alt.angst doesn't propose any remedies for what the group's FAQ calls "the notion that life is essentially pointless and absurd," but it does offer commiseration in the form of postings from the existentially challenged. The group's posters have identified units of Angst ("angstroms" – even more effective if said with a thick, German accent), as well as Angst-producing agents ("angstogens").

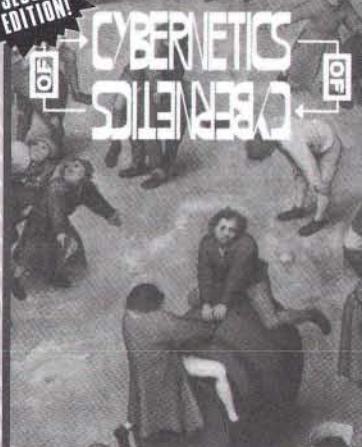
But be warned: smiling emoticons are not tolerated, and uplifting posts are punishable by flames from the angst.cops. (It should come as no surprise that the denizens of *alt.angst* can be contentious.) "If you have to ask why humans are mean and nasty," explains their FAQ, "you probably don't belong here."

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Dawkins

◀ 124 breeding had, of course, created an explicit awareness of links between genetic endowment and behavior. The double helix became the new scaffold for erecting theories of evolution.

For the young Dawkins, the ethology of Tinbergen quickly became the conceptual lens through which he viewed the world. Behavior, say of the chicks he studied as a graduate student, was the empirical observation that Dawkins sought to identify and explain. At the same time he was observing chicken processing, Dawkins was busy processing his data with a clunky punch-tape Elliot 803. The machinery metaphor – the machinery meme – that resonated with and reinforced Tinbergen's ideas ultimately welded itself to Dawkins's strong notions of the primacy of the gene. What happens to scientific thinking if the survival machine is defined by the machinery of the genes?

Amid this primordial soup of new paradigms, Richard Dawkins the ethologist rapidly mutated into an evolutionary biologist. In 1965, he hit upon an idea breathtakingly simple to understand but extraordinarily powerful in its implications. In essence, Dawkins argued for an ethology of the gene: How do genes communicate? How do genes behave differently in groups than they do as individuals? Why do genes cooperate? How do genes compete? The same questions ethologists ask about chicks and geese and chimpanzees are virtually identical to the sorts of questions they should be asking about the genome and its genes.

Others had played with this notion before, but Dawkins made it his own and aggressively pushed it into the mainstream of science culture.

As the first true ethologist of the gene, Dawkins de facto became an evolutionary biologist. How genes behave over time – which ones dominate, which ones die off, which ones cooperate, which ones compete, which ones change, which ones remain the same – is the very definition of an evolution based on the flow of information.

When Dawkins published *The Selfish Gene* in 1976, the book further heated the debate over whether humans were ruled more by nature or nurture, a debate refueled by the emerging sociobiologists – notably Harvard biologist Edward O. Wilson in his 1975 book *Sociobiology*. By proposing an ethology of the gene, Dawkins shifted that debate away from the individual animal as the unit of evolution to the nature, nurture, and behavior of the genes. With *The Selfish Gene*, Dawkins

offered scientists a conceptual bridge between the reductionist imperatives of molecular biology and the taxonomies of zoology, psychology, and sociology. In other words, the metaphor of the selfish gene not only created an important context to explain human and animal behavior – it also created a framework for molecular biologists to examine the organic interactions of genes. The metaphor scaled from double helices to human interactions.

But looking at the richness and complexity of life on Earth, Dawkins freely acknowledged that an ethology of the gene alone was simply not robust enough to explain evolution. So he applied a Darwinian view of culture, as well. Dawkins argued for the concept of *memes* – ideas that are, to use the felicitous phrase of William Burroughs, “viruses of the mind.” Memes are to cultural inheritance what genes are to biological heredity. A meme for, say, astrology, could parasitize a mind just as surely as a hookworm could infest someone’s bowels. Ideas – like genes – could compete and cooperate, mutate and conserve. They, too, are operated on by natural selection. Human evolution, Dawkins postulates, is a function of a co-evolution between genes and memes.

Even that was not enough. Dawkins’s intellectual adventure went well beyond the ethology of genes and memes to explore an even more radical insight into the nature of evolutionary dynamics. This idea, too, was astonishingly simple, but it offers a powerful intellectual framework for a new understanding of life as an information process.

What do genes and memes have in common? Dawkins asked. They are replicators. Through various but distinct coded systems, they reproduce; they effect change in their world so they can propagate, just like viruses in either digital or organic form. Dawkins’s most powerful paradigm is that the unit of evolution is not the individual – the gene – or the meme, but the *replicator*.

This was apostasy to Darwinian evolutionists, who took it as dogma that the dynamics of natural selection cared only for the fitness of individual organisms and absolutely nothing else. But here was Dawkins saying that what really counted in “nature tooth and claw” was the replicating code beneath the organism. Evolution is really the story of replicators *über alles*.

Dawkins aggressively evolved this replicator concept. He noted that discussing the evolution of birds without looking hard at the evolution of their nests, or at beavers without considering the evolution of their dams would be *prima facie* ridiculous. Each is

essential to the survival of the other. It is the combination of bird and nest, the combination of beaver and dam, that gives a competitive edge to the animals who build them. Not only does the body of an organism march to the orders of its genes, but so do the artifacts the organism builds or uses. In this sense, the egg uses both a chicken and a nest to make another egg, and so the nest, too, is an evolutionary extension of the egg.

In biology, the genes in the egg would be called its genotype, while the physical expression of those genes – the chicken – would be called its phenotype. Dawkins called this marriage of organism to artifact *The Extended Phenotype* – the title of his second book, published in 1982. Still extending the outer limits of his replicator idea, Dawkins used this “extended phenotype” construct to look beyond the individual and artifact to embrace the family of the organism, its social group, the tools and environments it created. These are part of the physical “readout” of the genes, the extended phenotype of the replicating code. The invisible code in genes are therefore, in a very real sense, manipulating large chunks of the visible world to their selfish advantage.

Of course humans – with our massive and complex array of technologies – have extended our phenotypes more than any other living species. Just like a bird’s nest, a beaver’s dam, or a groundhog’s intricate set of underground tunnels, our technologies are now an integral part of our evolutionary fitness. In light of Dawkins’s work, to be a scientist today and talk about human evolution divorced from technological evolution no longer makes sense. In the truest and most fundamental sense, human evolution is now inextricably bound with technological evolution. Taken to its natural conclusion, Dawkins’s idea suggests that humankind is really co-evolving with its artifacts; genes that can’t cope with that new reality will not survive into future millennia.

What happens to life – to artificial life – when our unit of evolutionary observation becomes the replicator? By framing life and its evolution in the context of replicators and networks of replicators, Dawkins has forced all of biology to reexamine its assumptions of the fundamental mechanics of living things. Is technology just what our genes want, or is it a cultural conspiracy of our genes and memes? Does human DNA control the technosphere we’ve created and live in and around? What does it mean to say that nerve gas and microprocessors are extensions of selfish genes? These questions – as much as the genetic underpinning of embryology and

neurophysiology – are the sorts of questions that evolutionists must now address, posits Dawkins.

So essential is Dawkins's work to redefining life that he might have fairly titled one of his books *On the Origin of Replicators* and expected it to revolutionize science in the most radical fashion since Darwin. But Dawkins is not the sort to run the risk of parodying Darwin in this way, because of his respect for the principles of natural selection. Already, however, this transforming view is proving to be an extraordinarily robust meme that is rapidly replicating in human minds.

When Dawkins spoke at the first artificial life conference in Los Alamos, New Mexico, in 1987, he delivered a paper on "The Evolution of Evolvability." This essay argues that *evolvability* is a trait that can be (and has been) selected for in evolution. The ability to be genetically responsive to the environment through such a mechanism as, say, sex, has an enormous impact on one's evolutionary fitness. Dawkins's paper has become essential reading in the artificial life community. His multidisciplinary, interdisciplinary fluency in fields ranging from ethology to software has made him someone who is closely watched not only by fans of his popular books but especially by his scientific peers, who range from Stephen Jay Gould to Marvin Minsky to Roger Penrose.

Now 54, Dawkins has few students of his own. He quietly confesses that he wouldn't mind becoming Oxford's first professor of synthetic evolution. (He is seriously on the lookout for an intellectually adventuresome benefactor to endow such a chair for him.) Dawkins likes tossing around a semi-serious idea of awarding prize money to spur innovation and ingenuity in artificial life. (A decade ago, when his Biomorph program came out, he offered US\$1,000 of his own money to anyone who could find the exact image of a chalice, or Holy Grail, he had come across in his own explorations. To Dawkins's surprise, a Caltech software jock claimed the prize within a year.) Dawkins detailed his new idea in an exchange of e-mail: "My prize would be for a visually appealing world in which the life-forms have a visible, and preferably 3-D, morphology on the computer screen. They must evolve adaptations not just to 'inanimate' factors like the weather (which would produce essentially predictable, not emergent evolution) but to other evolving life forms (which is a recipe for emergent properties)."

Ingenious, and yet there seems to be something vital missing from Dawkins's venture into multimedia evolution: the hard math. In his recent autobiography, Edward O. Wilson, every bit as much the ethologist as Dawkins, describes a lifetime odyssey of intellectual collaboration. Wilson recognized that he was woefully deficient in mathematical skills, so he proceeded to forge close ties with a number of biostatisticians and mathematicians to help him build accurate models of population biology.

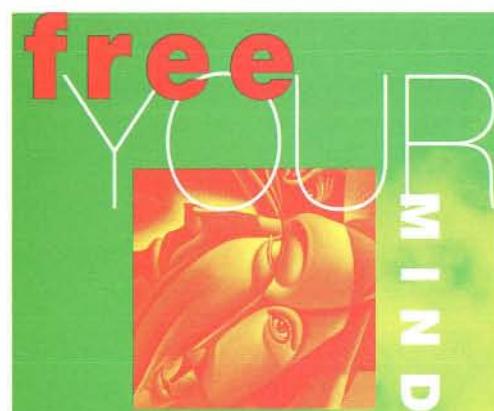
By contrast, Dawkins evinces some remorse but no particular desire to go beyond his amateur programming and formidable rhetorical skills to formalize his revolutionary evolutionary ideas into elegant algorithms that might win the respect of great mathematicians in the science community. He has had collaborators, none of whom ever really brought the rigor of quantitative formalism to his work. Dawkins's métier is metaphor – not mathematics.

Indeed, in an e-mail exchange, Dawkins is positively testy about discussing what might be the new math of replicators. He writes: "Equations are not my language. They are yours, and it was you that repeatedly brought the conversation back to equations. I'm not saying that this is not an important way to look at life. Just that it isn't my way, and I'm not equipped to answer questions on it."

That's not to say Dawkins needs to become expert in cellular automata or the new math of nonlinear dynamics to continue being a thought leader in the rapidly evolving field of artificial life. But, just as fields like physics and chemistry have increasingly become reified into mathematical representations, it seems inevitable that artificial life will mutate along similar dimensions.

Perhaps because of this, the lovely color biomorphs and color mollusks that he has bred on his Macintosh look, umm, a little anachronistic compared with the new artificial life menageries and terraria created by artificial-life breeders like Karl Sims and Tom Ray, who have a superb sense of computationally intensive algorithms. While Sims, working on a Connection Machine, can breed a digital 3-D creature that shimmers with lifelike dynamism, Dawkins's own virtual mollusk looks much like the sort of mollusk you find in a museum.

Dawkins will not be the intellectual adventurer who creates a set of artificial-life algorithms comparable to, say, Newton's calculus. But it would be a fitting tribute if, once they are created, those algorithms carried the name of the man whose memes made their discovery possible. ■ ■ ■



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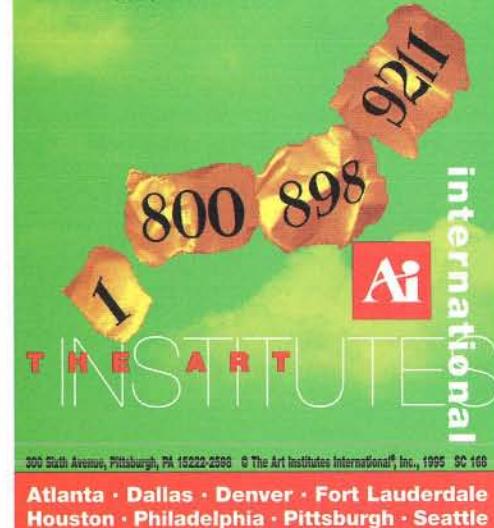
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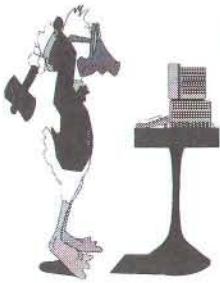
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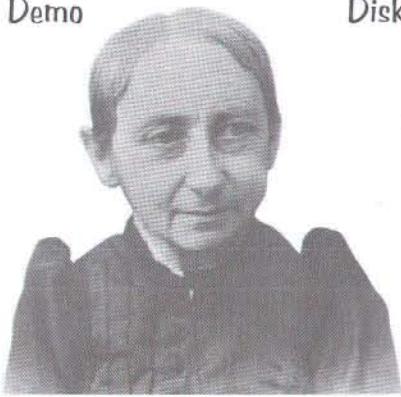
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Technopagans

◀ 133 circle. (As Rowley says, "in the San Francisco queer community, Paganism is the default religion.") In his black sports coat, slacks, and red Converse sneakers, Pesce seems an unlikely mage. Then Rowley calls for a toast and whips out a Viking horn brimming with homemade full-moon mead.

"May the astral plane be reborn in cyberspace," proclaims a tall sysop in a robe before sipping the heady honey wine.

"Plant the Net in the Earth," says a freelance programmer, passing the horn to his left.

"And to Dr. Strange, who started it all," Rowley says, toasting the Marvel Comics character before chuckling and draining the brew.

As the crowd shuffles back into the room, Pesce nervously scratches his head. "It's time to take the training wheels off my wand," he tells me as he prepares to cast this circle.

At once temple and laboratory, Pagan circles make room for magic and the gods in the midst of mundane space time. Using a combination of ceremonial performance, ritual objects, and imagination, Pagans carve out these tightly bounded zones in both physical and psychic space. Pagan rituals vary quite a bit, but the stage is often set by invoking the four elements that the ancients believed composed all matter. Often symbolized by colored candles or statues, these four "Watchtowers" stand like imaginary sentinels in the four cardinal directions of the circle.

But tonight's Watchtowers are four 486 PCs networked through an Ethernet and linked to

ominous foe from *Doom*.

WorldView is an x-y-z-based coordinate system, and Pesce has planted this cozy virtual world at its very heart: coordinates 0,0,0. As Pesce explains to the crowd, the circle is navigable independently on each PC, and simultaneously available on the World Wide Web to anyone using WorldView. More standard Web browsers linked to the CyberSamhain site would also turn up the usual pages of text and images – in this case, invocations and various digital fetishes downloaded and hyperlinked by a handful of online Pagans scattered around the world.

Wearing a top hat, a bearded network administrator named James leads the crowd through mantras and grounding exercises. A storyteller tells a tale. Then, in walks the evening's priestess, a Russian-born artist and exotic dancer named Marina Berlin. She's buck-naked, her body painted with snakes and suns and flying eyes. "Back to the '60s" whispers a silver-haired man to my left. Stepping lightly, Berlin traces a circle along the ground as she clangs two piercing Tibetan bells together 13 times.

With a loud, sonorous voice, Pesce races around the circle, formally casting and calling those resonant archetypes known as the gods. "Welcome Maiden, Mother, Crone," he bellows in the sing-song rhymes common to Pagan chants. "To the North that is Your throne, / For we have set Your altar there, / Come to circle; now be here!"

How much Pagans believe in the lusty wine-swilling gods of yore is a complex ques-

**Most Pagans embrace the gods of yore
with a combination of conviction and levity,
superstition and hard-core materialism.**

a SPARCstation with an Internet connection. Pesce is attempting to link old and new, and his setup points out the degree to which our society has replaced air, earth, fire, and water with silicon, plastic, wire, and glass. The four monitors face into the circle, glowing patiently in the subdued light. Each machine is running WorldView, and each screen shows a different angle on a virtual space that a crony of Pesce's concocted with 3D Studio. The ritual circle mirrors the one that Pesce will create in the room: an ornate altar stands on a silver pentagram splayed like a magic carpet over the digital abyss; four multicolored polyhedrons representing the elements hover around the circle; a fifth element, a spiked and metallic "chaos sphere," floats about like some

tion. Most Pagans embrace these entities with a combination of conviction and levity, superstition, psychology, and hard-core materialism. Some think the gods are as real as rocks, some remain skeptical atheists, some think the beings have no more or less actuality than Captain Kirk. Tonight's technopagans aren't taking anything too seriously, and after the spirits are assembled, Pesce announces the "the sacred bullshit hour" and hands the wand to his friend and mentor Rowley.

"Witchcraft evolved into the art of advertising," Rowley begins. "In ancient times, they didn't have TV – the venue was the ritual occurrence. Eight times a year, people would go to the top of the hill, to the festival spot, and there would be a party. They'd drink,

dance in rings, and sing rhyming couplets." Today's Pagans attempt to recover that deep seasonal rhythm in the midst of a society that yokes all phenomenon to the manipulative control of man. "It's about harmonizing with the tides of time, the emergent patterns of nature. It's about learning how to surf."

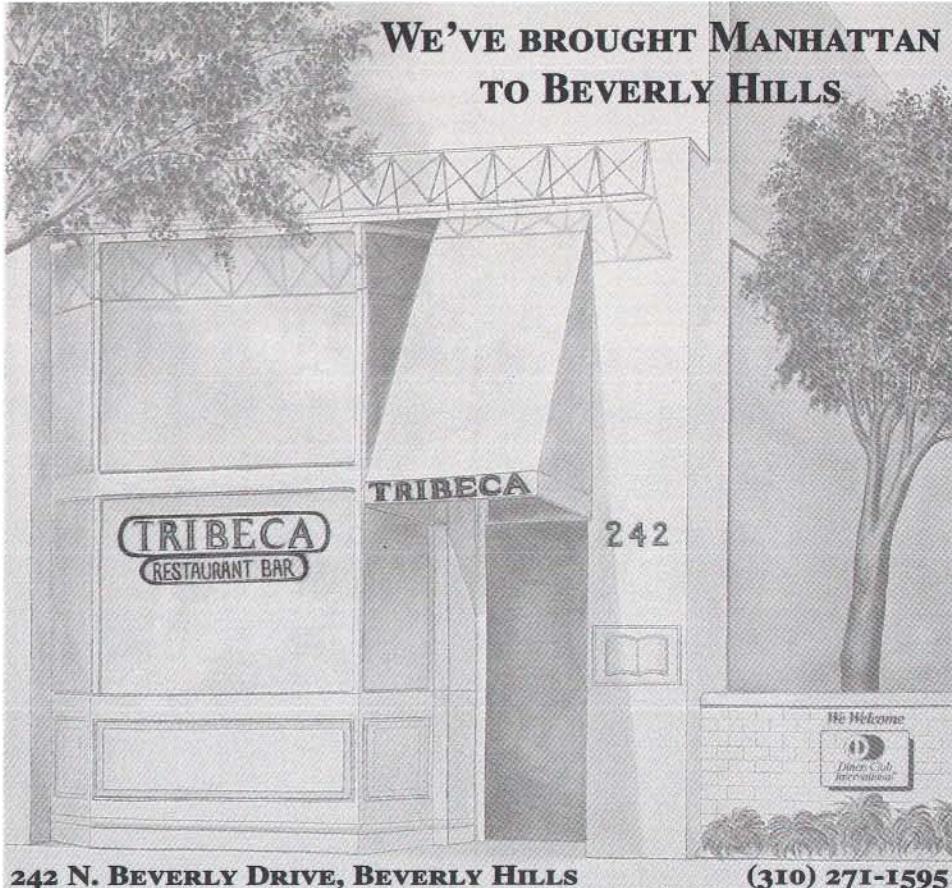
Samhain's lesson is the inevitability of death in a world of flux, and so Rowley leads the assembled crowd through the Scapegoat Dance, a Celtic version of "London Bridge." A roomful of geeks, technoyuppies, and multi-media converts circle around in the monitor glow, chanting and laughing and passing beneath a cloth that Rowley and Pesce dangle over their heads like the Reaper's scythe.

As a longtime participant-observer in the Pagan community, I join in with pleasure. Trudging along, grasping some stranger's sweaty shoulder, I'm reminded of those gung-ho futurists who claim that technology will free us from the body, from nature, even from death. I realize how unbalanced such desires are. From our first to final breath, we are woven into a world without which we are nothing, and our glittering electronic nets are not separate from that ancient webwork.

In 1985, when National Public Radio reporter and witch Margot Adler was revising *Drawing Down the Moon*, her great social history of American Paganism, she surveyed the Pagan community and discovered that an "amazingly" high percentage of folks drew their paychecks from technical fields and from the computer industry. Respondents gave many reasons for this curious affinity – everything from "computers are elementals in disguise" to the simple fact that the computer industry provided jobs for the kind of smart, iconoclastic, and experimental folk that Paganism attracts. Pagans like to do things – to make mead, to publish zines, to wield swords during gatherings of the Society for Creative Anachronism. And many like to hack code.

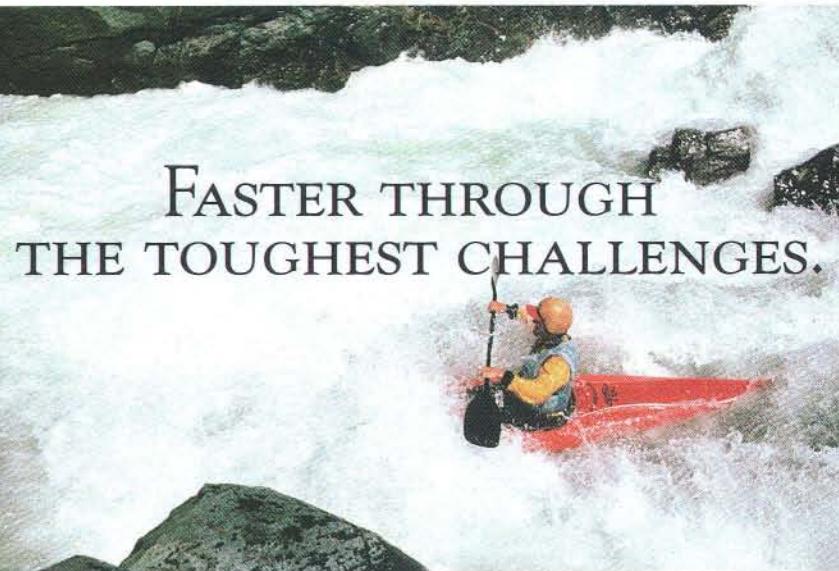
But if you dig deep enough, you find more intimate correspondences between computer culture and Paganism's religion of the imagination. One link is science fiction and fantasy fandom, a world whose role playing, nerd humor, and mythic enthusiasm has bred many a Pagan. The Church of All Worlds, one of the more eclectic and long-lasting Pagan groups (and the first to start using the word *pagan*), began in 1961 when some undergrad libertarians got jazzed by the Martian religion described in Robert Heinlein's *Stranger in a Strange Land*. Today, you can find occult books at science fiction conferences and Klingon rituals at Pagan gatherings. 176 ▶

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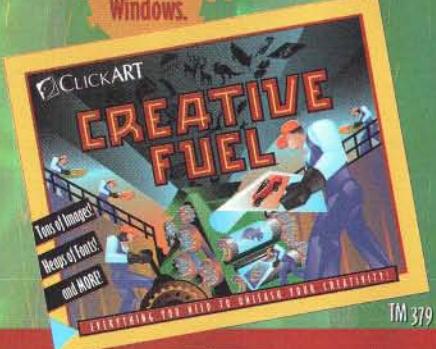
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Technopagans

◀ 175 Science fiction and fantasy also make up the archetypal hacker canon. Since at least the '60s, countless code freaks and techies have enthusiastically participated in science fiction and fantasy fandom – it's even leaked into their jokes and jargon (the "wizards" and "demons" of Unix are only one example). When these early hackers started building virtual worlds, it's no accident they copped these realms from their favorite genres. Like software programs, the worlds of science fiction and fantasy "run" on stock elements and internally consistent rules. One of the first digital playgrounds was MIT's early *Space Wars*, a rocket-ship shoot-'em-up. But the Stanford AI lab's *Adventure* game lagged not far behind. A text-based analog of *Dungeons & Dragons* that anticipated today's MUDs, *Adventure* shows how comfortably a magical metaphor of caverns, swords, and spells fit the program's nested levels of coded puzzles.

Magic and Pagan gods fill the literature of cyberspace as well. *Count Zero*, the second of William Gibson's canonical trilogy, follows the fragmentation of *Neuromancer*'s sentient artificial intelligence into the polytheistic pantheon of the Afro-Haitian *loa* – gods that Gibson said entered his own text with a certain serendipitous panache. "I was writing the second book and wasn't getting off on it," he told me a few years ago. "I just picked up a *National Geographic* and read something about voodoo, and thought, What the hell, I'll just throw these things in and see what hap-

spiritual kin, was fused with Catholic saints and other African spirits to create the pantheons of New World religions like Cuba's Santería, Brazil's Candomblé, and Haiti's Vodun (Voodoo). Like the Greek god Hermes, Legba rules messages and gateways and tricks, and as the lord of the crossroads, he is invoked at the onset of countless rituals that continue to be performed from São Paulo to Montreal. As legba (who doesn't capitalize her handle out of respect for the *loa*) told me, "I chose that name because it seemed appropriate for what MOOing allows – a way to be between the worlds, with language the means of interaction. Words shape everything there, and are, at the same time, little bits of light, pure ideas, packets in no-space transferring everywhere with incredible speed. If you regard magic in the literal sense of influencing the universe according to the will of the magician, then simply *being* on the MOO is magic. The Net is pure Legba space."

Whether drawn from science fiction, spirituality, or TV, metaphors make cyberspace. Though Vernor Vinge's *True Names* has received far less attention than *Neuromancer*, the novella explores the implications of cyberspace metaphors in one of the great visions of online VR. Rather than Gibson's dazzling Cartesian videogame, Vinge imagined cyberspace as a low-bandwidth world of sprites, castles, and swamps that, like today's MUDs, required the imaginative participation of the users. Anticipating crypto-anarchist obsessions, the novella's heroic covens elude state control through encryption spells that cloak

Our technological environment may soon appear as strangely sentient as the forests in which the first magicians glimpsed the gods.

pens. Afterward, when I read up on voodoo more, I felt I'd been really lucky. The African religious impulse lends itself to a computer world much more than anything in the West. You cut deals with your favorite deity – it's like those religions already are dealing with artificial intelligences." One book Gibson read reproduced many Haitian veves, complex magical glyphs drawn with white flour on the ritual floor. "Those things look just like printed circuits," he mused.

Gibson's synchronicity makes a lot of sense to one online Pagan I know, a longtime LambdaMOOer who named herself "legba" after one of these *loa*. The West African trickster Legba was carried across the Atlantic by Yoruban slaves, and along with the rest of his

their doings and their "true names."

Some of Vinge's sorcerers argue that the magical imagery of covens and spells is just a more convenient way to manipulate encrypted dataspace than the rational and atomistic language of clients, files, and communications protocols. Regardless of magic's efficacy, Vinge realized that its metaphors work curiously well. And as legendary science fiction author Arthur C. Clarke said in his 1962 *Profiles of the Future*, "new technology is indistinguishable from magic."

But convenience and superstition alone do not explain the powerful resonance between hermetic magic and communications technology, a resonance that we find in history, not just in science fiction (see "Cryptomancy

through the Ages," page 132). Even if magic is only a metaphor, then we must remember how metaphoric computers have become. Interfaces and online avatars are working metaphors, while visualization techniques use hypothetical models and colorful imagery to squeeze information from raw data. And what is simulation but a metaphor so sharp we forget it's not a metaphor?

Then there are the images we project onto our computers. Already, many users treat their desktops as pesky, if powerful, sprites. As online agents, smart networks, and intelligent gizmos permeate the space of our everyday lives, these anthropomorphic habits will leave the Turing test in the dust. Some industry observers worry that all this popular response to computers mystifies our essentially dumb machines. But it's too late. As computers blanket the world like digital kudzo, we surround ourselves with an animated webwork of complex, powerful, and unseen forces that even the "experts" can't totally comprehend. Our technological environment may soon appear to be as strangely sentient as the caves, lakes, and forests in which the first magicians glimpsed the gods.

The alchemists, healers, and astrological astronomers of old did their science in the context of sacred imagination, a context that was stripped away by the Enlightenment's emphasis on detached rationalism. Today, in the silicon crucible of computer culture, digital denizens are once again building bridges between logic and fantasy, math and myth, the inner and the outer worlds. Technopagans, for all their New Age kitsch and bohemian brouhaha, are taking the spiritual potential of this postmodern fusion seriously. As VR designer Brenda Laurel put it in an e-mail interview, "Pagan spirituality on the Net combines the decentralizing force that characterizes the current stage in human development, the revitalizing power of spiritual practice, and the evolutionary potential of technology. Revitalizing our use of technology through spiritual practice is an excellent way to create more of those evolutionary contexts and to unleash the alchemical power of it all."

These days, the Internet has replaced zines as the clearing-house of contemporary heresy, and magicians are just one more thread in the Net's rainbow fringe of anarchists, Extropians, conspiracy theorists, *X-Files* fans, and right-wing kooks. Combing through esoteric mailing lists and Usenet groups like *alt.magick.chaos* and *soc.religion.eastern*, I kept encountering someone called Tyagi Nagasiva and 178►

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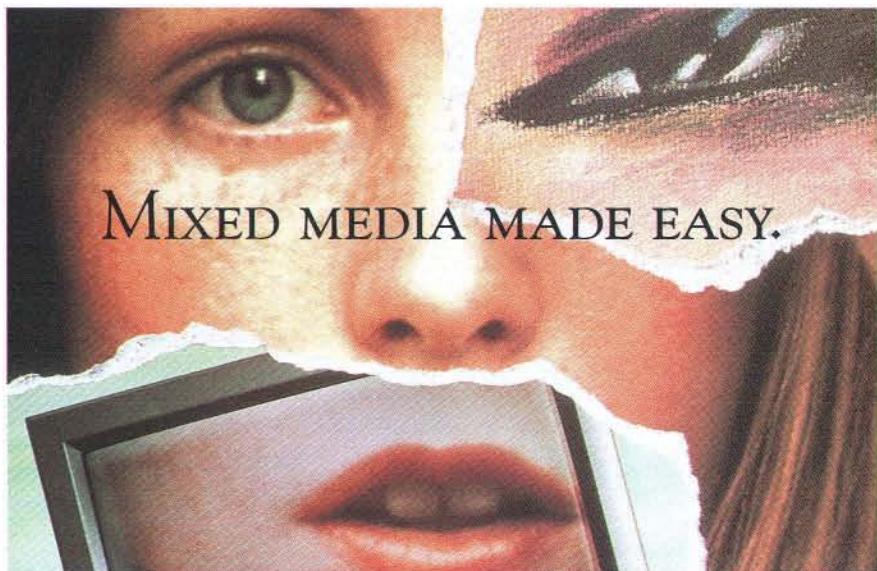
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Technopagans

◀ 177 his voluminous, sharp, and contentious posts on everything from Sufism to Satanism. Tyagi posted so much to alt.magick.chaos that Simon, one of the group's founders, created alt.magick.tyagi to divert the flow. He has edited a FAQ, compiled the *Mage's Guide to the Internet*, and helped construct Divination Web, an occult MUD. Given his e-mail address – tyagi@houseofkaos.abyss.com – it almost seemed as if the guy lived online, like some oracular Unix demon or digital jinni.

After I initiated an online exchange, Tyagi agreed to an interview. "You could come here to the House of Kaos, or we could meet somewhere else if you're more comfortable with that," he e-mailed me. Visions of haunted shacks and dank, moldering basements danced in my head. I pictured Tyagi as a hefty and grizzled hermit with a scruffy beard and vaguely menacing eyes.

But the 33-year-old man who greeted me in the doorway of a modest San Jose tract home was friendly, thin, and clean-shaven. Home-made monk's robes cloaked his tall frame, and the gaze from his black eyes was intense and unwavering. He gave me a welcoming hug, and then ushered me into his room.

It was like walking into a surrealist temple. Brightly colored paper covered the walls, which were pinned with raptor feathers and collages of Hindu posters and fantasy illustrations. Cards from the Secret Dakini Oracle were strung along the edge of the ceiling, along with hexagrams from the *I Ching*. To the

Rather than work with traditional occult systems, chaos magicians construct their own rules or throw them out altogether.

north sits his altar. Along with the usual candles, herbs, and incense holders, Tyagi has added a bamboo flute, a water pipe stuffed with plants, and one of Jack Chick's Christian comic-book tracts. The altar is dedicated to Kali, the dark and devouring Hindu goddess of destruction whose statue Tyagi occasionally anoints with his lover's menstrual blood. Other figures include a Sorcerer's Apprentice Mickey Mouse and a rainbow-haired troll. On the window sill lies the tail of Vlad the Impaler, a deceased cat. Near the altar sits a beat-up Apple II with a trackball that resembles a swirling blue crystal ball.

On one wall, Tyagi has posted the words Charity, Poverty, and Silence. They are reminders of monastic vows Tyagi took, vows with

traditional names but his own, carefully worked out meanings. (Tyagi is an adopted name that means "one who renounces.") "I just stopped grabbing after things," he said. "I made certain limitations and assertions on how I wanted to live and be in the world." His job as a security guard gives him just enough cash for rent, food, and dial-up time.

"For a long time, I had the desire to find the truth at all costs, or die trying," Tyagi said in a measured and quiet voice. After reading and deeply researching philosophy, mysticism, and the occult, Tyagi began cobbling together his own mythic structures, divination systems, and rituals – an eclectic spirituality well suited to the Net's culture of complex interconnection. Like many technopagans, Tyagi paid his dues behind the eight-sided die, exploring role-playing games like Dungeons & Dragons and Call of Cthulhu. He also delved heavily into chaos magic, a rather novel development on the occult fringe that's well represented on the Net. Rather than work with traditional occult systems, chaos magicians either construct their own rules or throw them out altogether, spontaneously enacting rituals that break through fixed mental categories and evoke unknown – and often terrifying – entities and experiences.

"Using popular media is an important aspect of chaos magic," Tyagi says as he scratches the fury neck of Eris, the Doggess of Discord. "Instead of rejecting media like many Pagans, we use them as magical tools." He points out that Thee Temple ov Psychick Youth, the chaotic magical organization that

surrounds the industrial band Psychick TV, would practice divination with televisions tuned to display snow. "Most Pagans would get online and say, Let's get together somewhere and do a ritual. Chaos magicians would say, Let's do the ritual online."

After compiling his original *Mage's Guide to the Internet* – an exhaustive directory of mailing lists, ftp sites, newsgroups, and MOOs – Tyagi hooked up with Moonchilde, also known as Joseph Traub, a god of an online MUSH devoted to Anne McCaffrey's *Dragonriders of Pern* series, and created an occult MUD called Divination Web (telnet [bill.math.uconn.edu](telnet://bill.math.uconn.edu) 9393). Originally, DivWeb presented a virtual geography of spiritual systems: a great Kabbalistic Tree of Life stood

PAGAN AND OCCULT RESOURCES

The Mage's Guide to the Internet (MaGI) is available at <ftp://ftp.portal.com/pub/ss/OMNet/magi>.

The Dark Side of the Net is a list of gothic, wiccan, pagan, vampire, occult, and various other dark resources available on the Internet: <http://www.cascade.net/dark.html>.

WORLD WIDE WEB SITES:

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FTP SITES:

<ftp://lysator.liu.se/pub/religion/neopagan> and <ftp://lysator.liu.se/pub/magick>.

USENET NEWSGROUPS:

alt.pagan and *alt.magick*.

FAQs on Egyptian gods, Golden Dawn, Kabalah, Magick Fiction, Necronomicon, and Tarot can be found at the ftp site <ftp://ftp.portal.com/pub/ss/Usenet/FAQs>.

in the center of a wheel whose various spokes mapped out different astrological signs and psychological states and linked up to other realms – Celtic, shamanic, Satanic. Down one path lay an amusement park devoted to religious heresy; another direction would send you down the river of the Egyptian afterlife. But Tyagi found the layout too structured, and now you just log into the Void.

These days, Tyagi cruises the Net from four to six hours a day during the week. "Being online is part of my practice. It's kind of a hermit-like existence, like going into a cave. I'm not really connected to people. I'm just sending out messages and receiving them back."

But for MOO-oriented magicians like Tyagi, the Net is more than a place of disembodied information. "Cyberspace is a different dimension of interaction. There's a window between the person who's typing and the person who finds himself in cyberspace," Tyagi explains. "If you're familiar enough with the tool, you can project yourself into that realm. For me, I start to associate myself with the words that I'm typing. It's less like I'm putting letters onto a screen and more like there's a description of an experience and I'm having it. It's a wonderful new experiment in terms of magic and the occult, and it connects with a lot of experiments that have happened in the past."

Like some MUD users, Tyagi finds 180 ►

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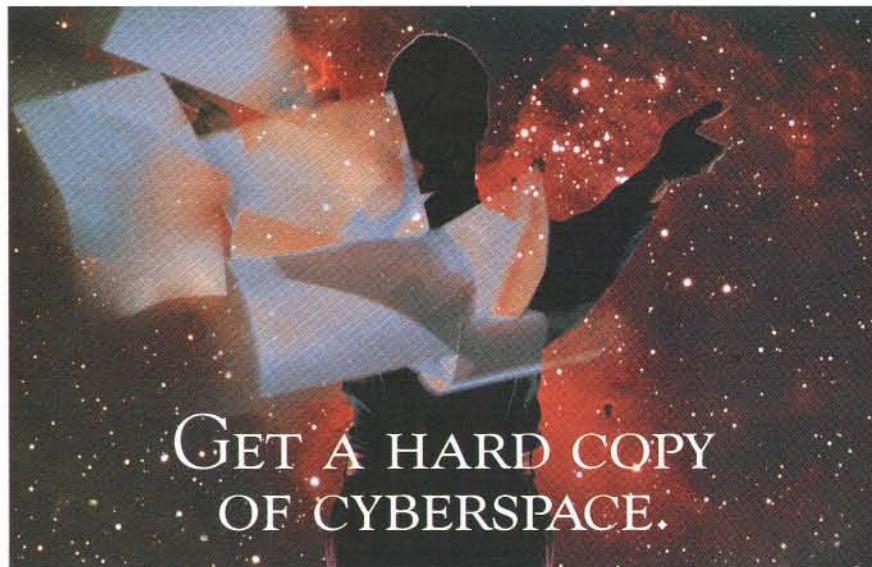
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Technopagans

◀ 179 that after logging heavy time in these online realms, he interacts with the offline world as if it were an object-oriented database. "Within the physical world, there are certain subsets that are MUDs – like a book. A book is a kind of MUD – you can get into it and move around. It's a place to wander. So MUDs become a powerful metaphor to see in a personal sense how we interact with different messages. Real life is the fusion of the various MUDs. It's where all of them intersect."

For the Druids and hermetic scholars of old, the world was alive with intelligent messages: every star and stone was a signature; every beast and tree spoke its being. The cosmos was a living book where humans wandered as both readers and writers. The wise ones just read deeper, uncovering both mystical correspondences and the hands-on knowledge of experimental science.

To the thousands of network denizens who live inside MUDs and MOOs like DivWeb or LambdaMOO, this worldview is not as musty and quaint as it might seem to the rest of us. As text-based virtual worlds, MUDs are entirely constructed with language: the surface descriptions of objects, rooms, and bodies; the active script of speech and gesture; and the powerful hidden spells of programming code. Many MOOs are even devoted to specific fictional worlds, turning the works of Anne McCaffrey or J. R. R. Tolkien into living books.

Hard-core MOOers know how substantial and enchanting textual worlds can become when fired up with active imagination.

For many VR designers and Net visionaries, MOOs are already fossils – primitive, low-bandwidth inklings of the great, simulated, sensory overloads of the future. But hard-core MOOers know how substantial and enchanting – not to mention addictive – their textual worlds can become, especially when they're fired up with active imagination, eroticism, and performative speech.

All those elements are important in the conjurer's art, but to explore just how much MOOs had to do with magic, I sought out my old friend legba, a longtime Pagan with a serious MOO habit. Because her usual haunt, LambdaMOO, had such heavy lag time, legba suggested we meet in Dhalgren MOO, a more intimate joint whose eerie imagery is lifted

from Samuel Delaney's post-apocalyptic science fiction masterpiece.

That's how I wind up here on Dhalgren's riverbank. Across the water, the wounded city of Bellona flickers as flames consume its rotten dock front. I step onto a steel suspension bridge, edging past smashed toll booths and a few abandoned cars, then pass through cracked city streets on my way to legba's Crossroads. An old traffic light swings precariously. Along the desolate row of abandoned storefronts, I see the old Grocery Store, legba's abode. Through the large and grimy plate glass window I can see an old sign that reads: Eggs, \$15.95/dozen. The foreboding metal security grate is locked.

Legba pages me from wherever she currently is: "The next fun thing is figuring out how to get into the grocery store."

Knowing legba's sense of humor, I smash the window and scramble through the frame into the derelict shop. Dozens of flickering candles scatter shadows on the yellowing walls. I smell cheese and apples, and a sweet smoke that might be sage.

Legba hugs me. "Welcome!" I step back to take a look. Legba always wears borrowed bodies, and I never know what form or gender they'll be. Now I see an assemblage: part human, part machine, part hallucination. Her mouth is lush, almost overripe against bone-white skin, and her smile reveals a row of iridescent, serrated teeth. She's wearing a long black dress with one strap slipping off a bony, white shoulder. Folded across her narrow back is one long, black wing.

I'm still totally formless here, so legba urges me to describe my virtual flesh. I become an alien anthropologist, a tall, spindly Zeta Reticuli with enormous black eyes and a vaguely quizzical demeanor. I don a long purple robe and dangle a diamond vajra pedant around my scrawny neck. Gender neutral.

Legba offers me some canned peaches. Pulling out a laser drill, I cut through the can, sniff the contents, and then suck the peaches down in a flash through a silver straw.

Once again, I'm struck at how powerfully MOOs fuse writing and performance. Stretching forth a long, bony finger, I gently touch legba's shoulder. She shivers.

"Do we bring our bodies into cyberspace?" Legba does.

She doesn't differentiate much anymore. "How is this possible?" I ask. "Imagination? Astral plane? The word made flesh?"

"It's more like flesh made word," legba says. "Here your nerves are uttered. There's a sense of skin on bone, of gaze and touch, of presence. It's like those ancient spaces, yes, but without the separations between earth and heaven, man and angel."

Like many of the truly creative Pagans I've met, legba is solitary, working without a coven or close ties to Paganism's boisterous community. Despite her online presence and her interest in Ifá, the West African system of divination, legba's a pretty traditional witch; she completed a Craft apprenticeship with Pagans in Ann Arbor and studied folklore and mythology in Ireland. "But I was sort of born this way," she says. "There was this voice that I always heard and followed. I got the name for it, for her, through reading the right thing at the right time. This was the mid- to late '70s, and it was admittedly in the air again. I went to Ireland looking for the goddess and became an atheist. Then she started looking out through my eyes. For me, it's about knowing, *seeing*, being inside the sentience of existence, and walking in the connections."

These connections remind me of the Crossroads legba has built here and on LambdaMOO. She nods. "For me, simultaneously being in VR and in RL [real life] is the crossroads." Of course, the Crossroads is also the mythic abode of Legba, her namesake. "Legba's the gateway," she explains. "The way between worlds, the trickster, the phallus, and the maze. He's words and their meanings, and limericks and puns, and elephant jokes and –"

She pauses. "Do you remember the AI in *Count Zero* who made those Cornell Boxes?" she asks. "The AI built incredible shadow boxes, assemblages of the scraps and bits and detritus of humanity, at random, but with a machine's intentionality." She catches her breath. "VR is that shadowbox. And Legba is," she pauses, "that AI's intentionality."

But then she shrugs, shyly, refusing to make any questionable claims about online gods. "I'm just an atheist anarchist who does what they tell me to do," she says, referring to what she calls the "contemporary holograms" of the gods. "It works is all."

I asked her when she first realized that MOOs "worked." She told me about the time her friend Bakunin showed her how to crawl inside a dishwasher, sit through the wash-and-rinse cycle, and come out all clean. She realized that in these virtual object-oriented spaces, things actually change their properties. "It's like alchemy," she said.

"The other experience was the first time I

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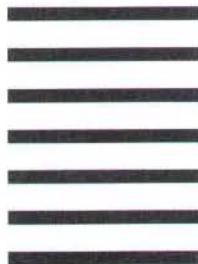
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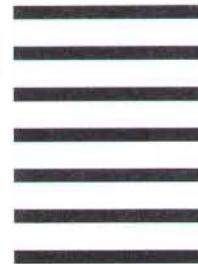
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desired somebody, really desired them, without scent or body or touch or any of the usual clues, and they didn't even know what gender I was for sure. The usual markers become meaningless."

Like many MOOers, legba enjoys swapping genders and bodies and exploring net.sex. "Gender-fucking and morphing can be intensely magical. It's a very, very easy way of shapechanging. One of the characteristics of shamans in many cultures is that they're between genders, or doubly gendered. But more than that, morphing and net.sex can have an intensely and unsettling effect on the psyche, one that enables the ecstatic state from which Pagan magic is done."

I reach out and gingerly poke one of her sharp teeth. "The electricity of nerves," I say. "The power of language."

She grins and closes her teeth on my finger, knife-point sharp, pressing just a little, but not enough to break the skin.

"It's more than the power of language," legba responds. "It's embodiment, squishy and dizzying, all in hard and yielding words and the slippery spaces between them. It's like fucking in language."

"But," I say, "jabbering in this textual realm is a far cry from what a lot of Pagans do – slamming a drum and dancing nude around a bonfire with horns on their heads."

She grins, well aware of the paradox. As she explains, our culture already tries to rise above what Paganism finds most important (nature, earth, bodies, mother), and at first the disembodied freedom of cyberspace seems to lob us even further into artificial orbit.

"But the MOO isn't really like a parallel universe or an alternate space," legba says. "It's another aspect of the real world. The false dichotomy is to think that cyberspace and our RL bodies are really separate. That the 'astral' is somewhere else, refined and better."

I hear a call from the mother ship. "I must take my leave now."

Legba grins as well and hugs me goodbye. I try to smile, but it's difficult because Gray aliens have such small mouths. So I bow, rub my vajra pendant, and wave. For the moment, my encounter with technopaganism is done. I've glimpsed no visions on my PowerBook, no demons on the MOO, and I have a tough time believing that the World Wide Web is the living mind of the Gaian Goddess. But even as I recall the phone lines, dial-up fees, and clacking keyboards that prop up my online experience, I can't erase the eerie sense that even now some ancient page of prophecy, penned in a crabbed and shaky hand, is being fulfilled in silicon. And then I hit @quit, and disappear into thin electronic air. ■ ■ ■

Goddesses

◀ 133 a practice which endorses the politeness that has been encouraged in women; men are drawn to this female world view in part because they cherish politesse. And if there are flames, as one Bay Area technopagan says, "there are equal-opportunity flame wars."

In fact, Shaw says, "men in technopaganism have to be comfortable with women in leadership roles and with serious and focused intellectual contact with women. If they're just cruising, they drop out fast."

Pagan Emma Bull, whose 1991 novel *Bone Dance* was nominated for both Nebula and Hugo awards says, "On the Net, you are androgynous unless you claim otherwise. Any sexuality is what you yourself have placed there – there's no gender in information-processing, and information doesn't have sex." Bull does point out, though, that the more ceremonial-magic Pagan groups tend to be more male-dominated, more hierarchical, and more "into who has juju and who doesn't."

However gender roles stack up, the bottom line for women is that technopaganism is empowering. So argues Kit Howard, who designs databases for a Midwestern pharmaceutical company; she is co-founder of the TechnoDruids Guild, an electronic support and advocacy group for the Druid community, and Chief Information Officer of ArnDraiocht Féin, one of the largest Druid organizations in the Pagan community. "You don't have to be stupidly feminist, and you don't need to displace men," she says. "Technopaganism creates a self-selection, where women are more activist, and men are more sympathetic."

In order to make it in the male-dominated world of technology, women often have to be the biggest logical-positivists on the block, outdoing any of the guys in syllogistic thinking and no-nonsense tough-mindedness. Technopaganism allows them to reclaim their femmie sides.

What's more, Harlow suggests, if a woman is "very left-brain, she may have to work harder" to reconnect with spiritual and intuitive sides. And if you're a woman who functions well in traditionally male societies, it can be tremendously comforting to find a path where you can explore female aspects of the universe, both physical and metaphysical, without that being considered wimpy or ineffectual.

With technopaganism, a woman technologist gets to be the girl and gets to be powerful, all at the same time. ■ ■ ■



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Net Value

◀ 141 to the movie *Disclosure*? How much was his name worth?

In the world of media and entertainment, there is not very much of a support or training market per se. (Classes in playing *Fig Mutant Space Rangers*, anyone?) The payments to creators are most likely to come not from the viewers, readers, or listeners, but from advertisers.

The challenge for advertisers is to make sure that their advertising messages are inextricable from the content. In some cases, it will mean that advertising will be as good as editorial content: truly funny commercials, informative, truthful product information, and so forth. Advertisers will pay for the services of the creators, if not necessarily for the content. As is happening now, famous people will contract to promote products or companies. In essence, advertisers will sponsor lives, or online forum hosts, rather than content. Just as prominent patrons such as the Medicis sponsored artists during the Renais-

effective than placing advertising alongside content where it can more easily be removed or completely ignored by customers.

With the means of production growing cheaper and easier because of the Net, a bifurcation will take place: more and more people will produce material for smaller audiences of their friends, while those seeking large audiences will give their stuff away or seek payment from a sponsor – and try to persuade influencers to recommend it.

In the end, the only unfungible, unreplicable value in the new economy will be people's presence, time, and attention; to sell that presence, time, and attention outside their own community, creators will have to give away content for free. As John Perry Barlow points out in "The Economy of Ideas" (see *Wired* 2.03, page 84), that's exactly what the Grateful Dead do by encouraging people to tape their performances (and a performance is not just the Grateful Dead on the stage; it's all the people there with you). Enough of the people who copy and listen to Grateful Dead tapes end up paying for hats, T-shirts, and

The challenge for advertisers is to make sure that their advertising messages are inextricable from the content that surrounds them.

sance, corporations and the odd rich person will sponsor artists and entertainers in the new era. The Medicis presumably had the pleasure of seeing or listening to their beneficiaries and sharing access to them with their friends. This won them renown and attention as well as a certain amount (we hope) of sheer pleasure at experiencing the art. Of course, they could also hike over to the studio at any time to watch their artist at work (and perhaps find him at play?).

Overall, entertainment will become cheaper and cheaper, since so much of it will be sponsored. Rights to transmit or display particular creative works will exist, but they will usually be purchased by third parties rather than consumers – for redistribution to consumers. However, those rights will be hard to protect or exploit thereafter. Much information and entertainment, once paid for, will simply be disseminated free, as consumers won't pay more than a little, and competing suppliers will bid prices down. The advertiser will gain from being the first to deliver the content, and possibly from redistribution of its ads along with the content and identification with it. Product placement within content will be much more

performance tickets. In the new era, the ancillary market is the market.

The vacuum of attention

The popular notion about cyberspace is that it is infinite and unbounded. But it, too, is limited by the amount of human attention available in it. Does a place in cyberspace exist if no one visits it?

What makes any kind of real estate valuable? Just ask a restaurateur! It's not mere buildings. There's a complex interaction among tenants and visitors, the physical plant and the services, as well as the location. Real estate in cyberspace works similarly.

The initial appeal of real estate may be proximity to other space – it's easy to find on your way somewhere else. The Net equivalent (more or less) is a listing in someone's guide, for example, a pointer in a Web page, or highlighted availability through a service such as CompuServe or Poland Online. The virtual space near any particular location is limited – just like retail space along Fifth Avenue in New York, Bond Street in London, or Nevsky Prospekt in St. Petersburg. There are just so many services to highlight or point to a particular location.

THE TROUBLE WITH COMPUTERS

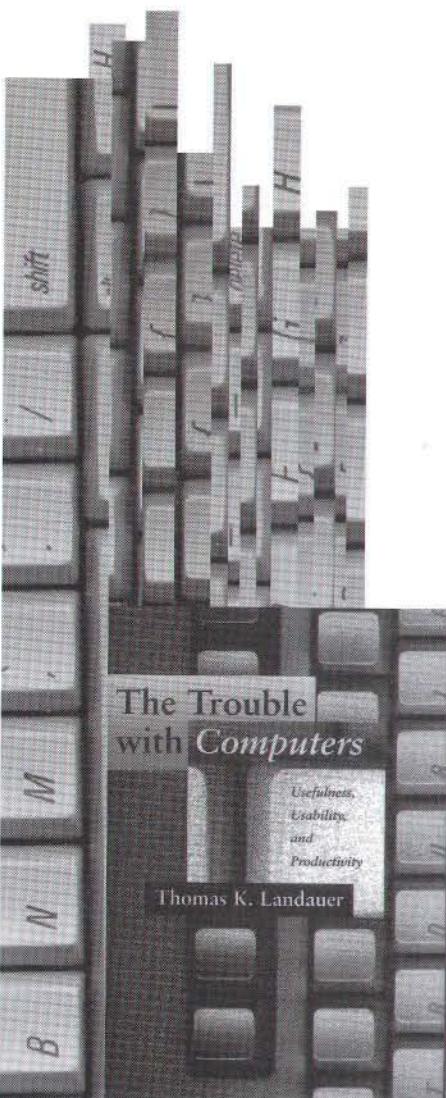
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But you can also build your land up so that more people want to pass through it. You can add restaurants or tony shops. On the Net, content can draw people in. It can attract a certain crowd, tune out others (there's a story about mall owners who played classical music to drive the teenagers away), and provoke all sorts of interesting interaction among the visitors. Just as shopping malls offer rides, and cafes are not only places to buy lattés but places where people can meet, so will cyberspace real estate provide environments for engaging social interaction.

People draw more people: they exist as content that no one owns, but content that is sold to other members of the market. Live performances and the presence of others attract still more visitors or customers. Free copies of performances and videos can serve as advertising for live performances, genuine two-way interaction with the performers, or membership in the community where these things happen.

Content and people (like goods) that get visibility in favorable locations gain in popu-

larity (to some limit), and can thereafter be used in other locations to raise value elsewhere (within limits). This is all a delicate game, appropriately reminiscent of the intricate arrangements of broadcast programming and counter-programming.

Contrary to the notion that the Net will be a disintermediated world, much of the payment that ostensibly goes for content will go to the middlemen and trusted intermediaries who add value – everything from guarantees of authenticity to software support, selection, filtering, interpretation, and analysis. The redistributor's goal is to be the most convenient source of content and to put its own attitude or personality around the content; the underlying content is unlikely to be exclusive, since the content provider wants to maximize its distribution (either for revenues – however small per item – or for advertising breadth).

The problem for owners of content is that

Just as cafes are not only places to buy lattés, but places where people meet, so will cyberspace real estate provide environments for social interaction.

they will be competing with free or almost-free content, including their own advertising as well as the output of myriad creators who launch products on the Net.

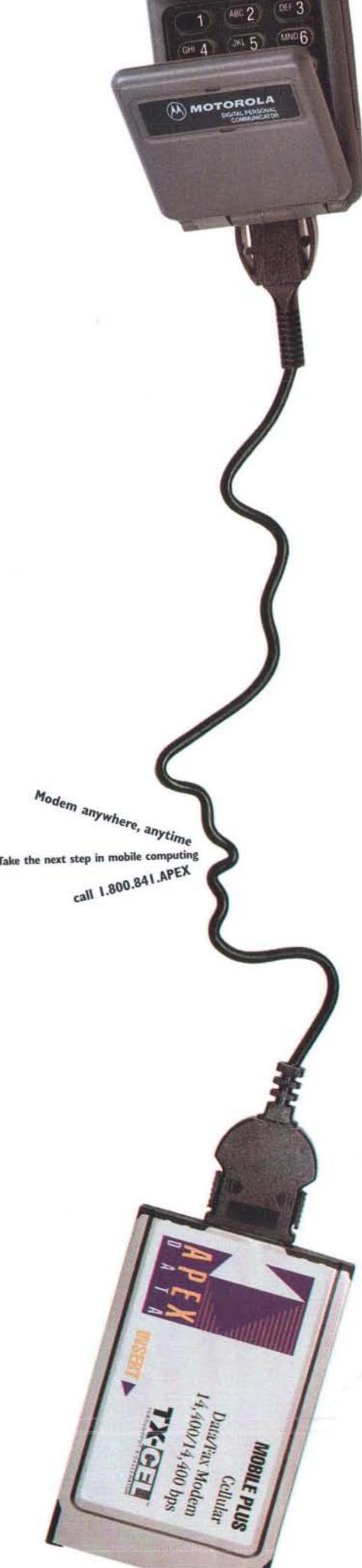
Creators worry that they won't be paid, and that their creative efforts may be discouraged. The free-content market will discourage redundant effort, since the wheel won't need to be reinvented. The almost-free content market might also discourage a lot of crummy content and marketing designed to draw attention to such content. Why market a book that's *free*? It should sell by itself (drawing attention to the author) or not at all. There's no external reason to sell it, so poor novels won't be foisted on the public, and good ones may find their audience by themselves – or through the efforts of filter agents who get rewarded for finding (not creating) good content. The novelist, then, will be rewarded by fees for his or her performances, or perhaps by finding sponsors for future work. He or she may write serials and find people who are willing to pay for this service.

Return of the middlemen

Aside from a few leaders who manage to sell brand-name content widely and cheaply, the most promising businesses in the Net world will be services and processes. They will include selecting, classifying, rating, interpreting, and customizing content for specific customer needs. Other services will include access to various sorts of performing, interacting with people, and all kinds of other activities that require the time of a live, talented person. Even those who sell content will invest in distribution channels, whether or not they own them; the value added in those channels will be tied to (and will enhance) the value of the content they sell.

Much chargeable value will be in certification of authenticity and reliability, not in the content. Brand name, identity, and other marks of value will be important; so will security of supply. Customers will pay for a

The final result for creators in this new world is that intellectual value markets will bifurcate into content assets of premium prices and high value, and services 184 ▶





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Net Value

◀ 183 and processes built around free or cheap content. The middle disappears.

To many people, such a world is frightening, since it does not require any laws to change or be broken. It's simply the unfolding expression of economic laws – of demand and scarcity – applied in the future world of electronic content and commerce. It's not the world most creators and intellectual property owners have been planning for, contracting for, securing rights for.

Of course, this new world will distribute its benefits differently than how they are distributed today. But as long as the rules are the same for everyone – and predictable – the game is fair. The big issue is the transition.

And there will be rules: copying content will be easy and acceptable in most cases; protected content will be "special," presumed to be of high value. (And it will have to be if the creators want to keep their reputations.) Protected content will be tagged and monitored (for one method, see "Digital Water-

knows about flatter organizations and virtual corporations. But how do they play out in texture as opposed to structure?

The short answer is that companies will – must – become more visible. More of what any company sells will comprise information – whether it's plain bits over the Net or consulting services, design services, management development. As in the past, some companies will sell products to myriad customers; others will add value to only a few key ones. But in a knowledge world, the quality of those relationships will matter more than the contractual conditions (as in a marriage). The best cement is a two-way flow of information, or visibility. Companies will try to find partners not by offering discounts but by sharing information about themselves and by exchanging their competitive wisdom. In order to make their wisdom credible, they will have to be self-revealing.

Moreover, whether or not a company chooses to be visible, it *will* happen. You can't hide. And the image you project – on your Web home page or elsewhere – will and

What's a company's greatest asset, according to many annual reports? It's people and partners, of course – not intellectual property.

marks," page 141), and use will be metered. Some payments will be for content, some for time, some for transactions. This system of control will be managed by efficient, well-designed computer systems – a delightful intellectual engineering challenge that will keep many programmers and companies busy for years, and that will reward some venture capitalists.

There will also be strong legal and social pressures for authenticity, integrity, trademarks, and identification. Most often, you will be able to copy something freely, but you can't claim for it an identity or origin it doesn't have. Discrete works must be attributed; derivative works (assembled or modified from identified original components) will have to find their own value.

A market of visibility

All these emergent economic pressures and social conventions will spill over into the framework of organizations in this new world. What's a company's greatest asset, according to many annual reports? People and partners, of course, not computers or even intellectual property. In the new world of the Net, much will change. Everyone

should be true. It's not just outsiders peering in, it's your own employees out in the electronic world: they *are* the company. As both physical and intellectual products lose their value (in the manner described above), the interactions with your company will be what you sell. And the quality of the interactions you foster will be what draws employees to your firm or community. People want to buy information-based services and products from visible companies that operate as partners. They do not want commodity products from black boxes.

The question of what happens to intellectual property on the Net may be summed up like this: value shifts from the transformation of bits rather than bits themselves, to services, to the selection of content, to the presence of other people, and to the assurance of authenticity – reliable information about sources of bits and their future flows. In short, intellectual assets and property depreciate while intellectual processes and services appreciate. ■ ■ ■

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Digital River

◀ 123 digital information.

What is more, they are truly digital, in the full and strong sense of computers and compact disks. The genetic code is not a binary code as in computers, nor an eight-level code as in some telephone systems, but a quaternary code, with four symbols. The machine code of the genes is uncannily computerlike. Apart from differences in jargon, the pages of a molecular-biology journal might be interchanged with those of a computer-engineering journal. Among many other consequences, this digital revolution at the very core of life has dealt the final, killing blow to vitalism — the belief that living material is deeply distinct from nonliving material. Up until 1953, it was still possible to believe that there was something fundamentally and irreducibly mysterious in living protoplasm. No longer. Even those philosophers who had been predisposed to a mechanistic view of life would not have dared hope for such total fulfillment of their wildest dreams.

The following science fiction plot is feasible, given a technology that differs from today's only in being a little speeded up. Professor Jim Crickson has been kidnapped by an evil foreign power and forced to work in its biological-warfare labs. To save civilization, it is vitally important that he should communicate some top-secret information to the outside world, but all normal channels of communication are denied him. Except one. The DNA code consists of 64 triplet "codons," enough for a complete upper- and lower-case English alphabet plus 10 numerals, a space character, and a full stop. Professor Crickson takes a virulent influenza virus off the laboratory shelf and engineers into its genome the complete text of his message to the outside world, in perfectly formed English sentences. He repeats his message over and over again in the engineered genome, adding an easily recognizable "flag" sequence — say, the first 10 prime numbers. He then infects himself with the virus and sneezes in a room full of people. A wave of flu sweeps the world, and medical labs in distant lands set to work to sequence its genome in an attempt to design a vaccine. It soon becomes apparent that there is a strange repeated pattern in the genome. Alerted by the prime numbers — which cannot have arisen spontaneously — somebody tumbles on the idea of deploying code-breaking techniques. From there it would be short work to read the full English text of Professor Crickson's message, sneezed around the world.

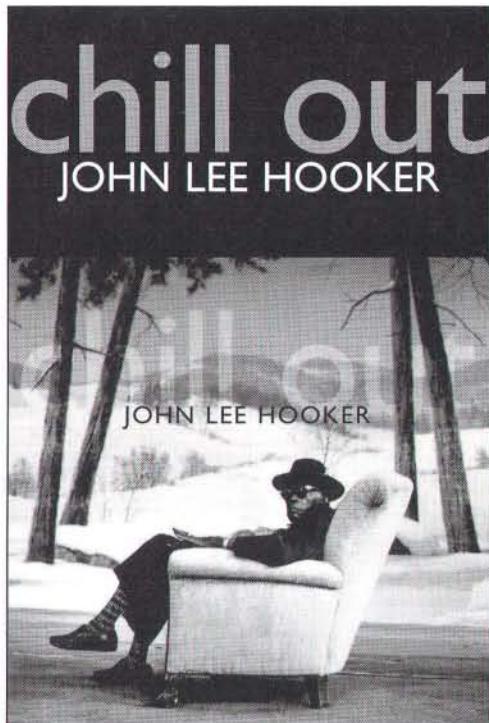
Our genetic system, which is the universal

system of all life on the planet, is digital to the core. With word-for-word accuracy, you could encode the whole of the New Testament in those parts of the human genome which are at present filled with "junk" DNA — that is, DNA not used, at least in the ordinary way, by the body. Every cell in your body encodes the equivalent of 715 Mbytes of information, reeling off digital characters via numerous reading heads working simultaneously. In every cell, these tapes — the chromosomes — contain the same information, but the reading heads in different kinds of cells seek out different parts of the database for their own specialist purposes. That is why muscle cells are different from liver cells. There is no spirit-driven life force, no throbbing, heaving, pullulating, protoplasmic, mystic jelly. Life is just bytes and bytes and bytes of digital information.

Genes are pure information — information that can be encoded, recoded and decoded, without any degradation or change of meaning. Pure information can be copied and, since it is digital information, the fidelity of the copying can be immense. DNA characters are copied with an accuracy that rivals anything modern engineers can do. They are copied down the generations, with just enough occasional errors to introduce variety. Among this variety, those coded combinations that become more numerous in the world will obviously and automatically be the ones that, when decoded and obeyed inside bodies, make those bodies take active steps to preserve and propagate those same DNA messages. We — and that means all living things — are survival machines programmed to propagate the digital database that did the programming.

With hindsight, it could not have been otherwise. An analog genetic system could be imagined. But it would resemble a Xerox of a Xerox of a Xerox. After 800 photocopying "generations," all that's left is a gray blur. Boosted telephone systems, recopied cassette tapes, photocopies of photocopies — analog signals are so vulnerable to cumulative degradation that copying cannot be sustained beyond a limited number of generations. Genes, on the other hand, can self-copy for 10 million generations and scarcely degrade at all. Darwinism works only because — apart from discrete mutations, which natural selection either weeds out or preserves — the copying process is perfect.

Only a digital genetic system is capable of sustaining Darwinism over eons of geological time. Only a digital river of genetic code could have carried us out of life's Precambrian Eden and into the present day. ■ ■ ■



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Demo Coders

◀ 145 son, the other half of European youth manage to resist the temptation of the ticket-price publicity, which always proclaims "Girls – free!"

Because of the age range, demo parties usually place a blanket ban on alcohol and drugs; to cover themselves, organizers put out a disclaimer regarding software piracy. "Besides, a typical party is a stamina and endurance test to match anything a game show could devise," Steve reports. "External stimulants are the last thing you need if you're trying to keep your mind on your latest demo release. You're exhausted, you're running low on sleep and high on adrenaline, and you're starting to smell bad. But the competitive nature prevails."

Because of the size of the events, the demo contests are divided into categories: best overall demo, best music, best intro under 40 Kbytes. There are separate classes for different machines: chiefly the Amiga and its new archrival, the PC. Steve estimates that, across the board, cash prizes can total more than £10,000 (about US\$15,500). "It's a hell of an incentive to write something that's really respectable," he observes. Comparisons with large-scale commercial computer graphics fairs are obvious. "That's what they are," he agrees. "They're the poor man's SIGGRAPH."

to why Europe – and Scandinavia in particular – has become the heart of the demo coding scene. Some cite the long, cold evenings, the easy overland access from one country to another, or the lack of decent commercial software. This also suggests where demo innovation will come from in the future: Eastern Europe. "Hungary, Slovenia, Russia – they've all got a good demo scene," Jolyon Ralph explains. "They're in exactly the same situation we were in during the late '80s – brilliant computers but no proper programs for them, so they write their own."

The skills learned from coding demos can transfer to more commercial applications – typically, writing games. The best-known products of this include the much-acclaimed *Pinball Dreams/Fantasies/Illusions* series (published by 21st Century Entertainment, written by Swedish demo group Digital Illusions), and the graphically astonishing *Asteroids* clone, *Stardust* (from Finland-based Bloodhouse). But some companies, wary of pirates, are still reluctant to take on demo programmers. And besides, as the games magazines never tire of pointing out, there's more to gameplay than good graphics and sound.

That said, the guys at Almathera still estimate that games-writing careers are a powerful lure. "The big two killers for demo groups are people going off into the games industry, and conscription into the army," says Jolyon. This is particularly true of the Scandinavian

from Ass93 is not called *Bananamen* but *Tequila*. The intro by Shining was running about 125 percent slower than the one in *Tequila*. Dweezil did a great job of optimizing the method! But, it was Tizzy who used the method first."

Lame and *kewl* (or *kool*, depending on who's talking) are the two big buzz words of the demo scene, forever debated in the demo forums – *lame* in this case referring to any scanned or copied graphics, sound samples, or visual effects that are previously worked out rather than calculated in real time, and the uploading of old software to BBSes. *Kewl* is equated with winning competitions, coding difficult routines and making them look easy; obtaining, cracking, and spreading prerelease versions of commercial software; and having a life outside the digital underground. Other hot topics include, "Are mail-swappers needed in a demo team?" "Is piracy really killing the machines?" "Rave and hard-core techno versus heavy-metal and rock." And the old chestnut, "Who is a lamer?"

Nowhere else in teen culture (except, perhaps, on the Web, where demos are thriving) will you find this reckless adolescent enthusiasm coupled with intense discussion of detailed physics and mathematical theorems, arguments over excerpts from professional computer-graphics textbooks, and all-out hard-core technical advice on coaxing the most from your machine. Take this example regarding saving extra microseconds when coding on the Amiga 4000: "At the extreme, an '040 will have to dump out 4k of copyback, and will have to read in the 4k of cache, which is $(4096+4096)/4=2048$ memory accesses, which will take a minimum of 2096x40ns ('040 clock cycle), or 80ms to get back to how it was before the flush."

As long as there are home computers and scores to be settled, kids will be writing demos. Although the prospect of large cash prizes and programming careers are powerful incentives, the months of effort required to create a demo transforms the process into a labor of love. In a world where programs are a plaything, where the clicking of an empty Amiga disk drive is as challenging as the ball-bearing rattle of a spray can, it's simply about proving who's the best. As Jolyon Ralph says, "It's a completely underground thing that's completely harmless. No one gets hurt. Apart from Atari owners, of course." ■ ■ ■

The skills that hackers learn from coding demos can transfer to more commercial applications – typically, writing games.

Although broadly despised by the Amiga community, the PC has helped revitalize the demo industry, especially now that the old enemy, the Atari ST, has disappeared from the scene – a disappearance hastened, if you believe the coders, by the sheer superiority of Amiga demos. Even PC coders – like Trixter of the US group Hornet – admit that Amiga releases have much more flair, style, and presentation, although IBM demos have more horsepower. "3-D Gouraud-shaded, light-sourced, texture-mapped polygons will tax the average Amiga. A 486-66 can do them quite nicely," he quips. "But Amiga coders are generally 95 percent European, and about 40 percent are from Finland. Something about those wacky Finns just keeps them churning out stuff with style."

All on the scene have their own theories as

countries, where a year of national service is mandatory. (Jolyon and Steve have seen several groups appear almost out of nowhere and produce several startling and successful releases, only to fall apart just as quickly when key members go off to spend 12 months in the armed forces.) Nevertheless, Jolyon suspects that this "may be why the Scandinavian countries have particularly good demo coders – because they have to get it done quickly!"

Despite (or because of) these real-world intrusions, a glance at disk magazines and demo newsgroups (<alt.sys.amiga.demos>, for instance) shows that the demo culture is still going strong. This unique mix consists in part of standard fan quibbles over the merits of particular coders and their demos. One posting reads: "First of all, Dweezil's intro

The best source for downloading Amiga demos are Aminet sites: <ftp.luth.se>, <ftp.wustl.edu>, or <http://src.doc.ic.ac.uk>. PC demos can be had from <ftp.mpoli.fi> or <ftp.cdrom.com>.

Interactive TV

◀ 153 most enthusiastic customers Time Warner will find, it seems reasonable to ask for their price. Mr. Willard says he wouldn't mind spending \$75 to \$80 per month on the system, a figure that Time Warner executives say could be typical. "We were paying that already in monthly spending on cable, plus movie rentals and videogames for the kids."

Will that be enough for Time Warner? Analysts estimate that the set-top terminals, custom built by Silicon Graphics and Scientific Atlanta, cost upward of \$3,000 each. Then there's the sleek new remote-control units, the system's HP DeskJet 550C color printers for printing coupons, and the Atari Jaguar unit. Not to mention the elaborate network operations center at Time Warner's offices. Add this up and the cost easily tops \$5,000 per home for the 4,000 households that will have all this stuff when the test is in full swing, according to analysts and published reports.

Recouping investment on such networks won't be easy. This is why Tom Feige, the president of the Full Service Network, says, "There has to be more revenue than just the

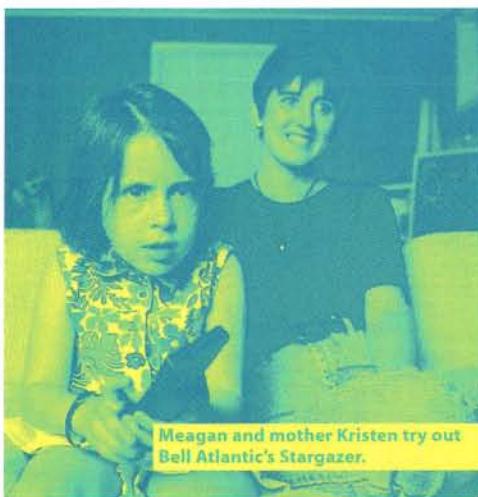
Time Warner intends to rely on interactive advertising. But will viewers want it?

Willards's \$80." Feige began his career selling cable subscriptions door-to-door in 1978. He's the man with a plan to supply 85 percent of Time Warner's 9 million subscribers with the network by 1998 and the one who must figure out how this system will eventually make money for the company. He won't comment on reports of how much all this is costing Time Warner. But he says: "We think the expense is worthwhile because it lets us climb a steep learning curve. We'll be finding out what people like and why."

"We've run lots of numbers," Feige adds, "and we're very comfortable that we'll be making a good return." Besides, he says, the costs will eventually come down. He expects the set-top boxes to sell for less than \$500 in two years.

His business model relies heavily on interactive advertising. He predicts that people will want to interact with ads for information-intensive products like cars and pharmaceuticals. But at this point there's no solid evidence that large numbers of people want to interact with TV ads or shop this way. The \$4 billion video-shopping and infomercial industry has been successful because tantalizing videos of beautiful models create demand. Some

people think QVC is entertaining. Besides, the cable industry has never been very successful in attracting regular ads. Less than 20 percent of its revenue comes from advertisements, whereas the broadcast industry gets nearly 100 percent of its revenue this way. Feige acknowledges this and admits that no one knows for sure whether these ad concepts will work. He says simply that he's now in the phase of "understanding the market research."



Meagan and mother Kristen try out Bell Atlantic's Stargazer.

The last stop on the tour is Fairfax County, Virginia, the county with the highest median household income in the United States. It's a land of lawyers, lobbyists, and high-tech workers living in edge cities built from scratch in the 1980s. Peering out from the trees lining the highway are rows of gleaming office towers emblazoned with meaningless corporate names, like Cordant and Visix. "Everything you see has been built in the last five years," the taxi driver told me on my way from Dulles Airport. This is Bell Atlantic's interactive TV test zone.

Since my last visit to the company's "digital factory" in Reston, Virginia (see "Align and Conquer," *Wired* 3.02, page 110), Bell Atlantic's joint video venture with Nynex and Pacific Telesis Group has been busy: its agent, Michael Ovitz, recruited former CBS programming chief Howard Stringer to run the company, now known as Tele-TV. In addition, the company began rolling out its Stargazer service. At the time of this visit, the service was just recently installed into the homes of 50 "friendly" 190►

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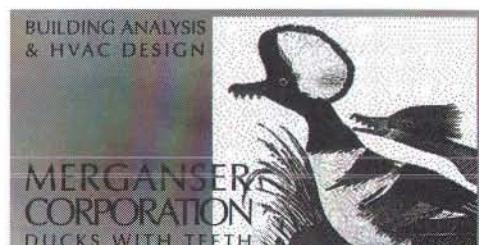
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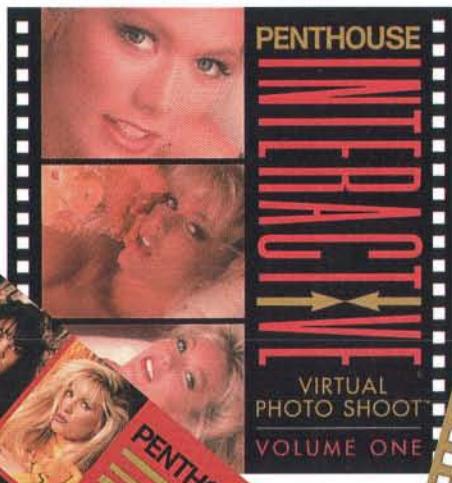
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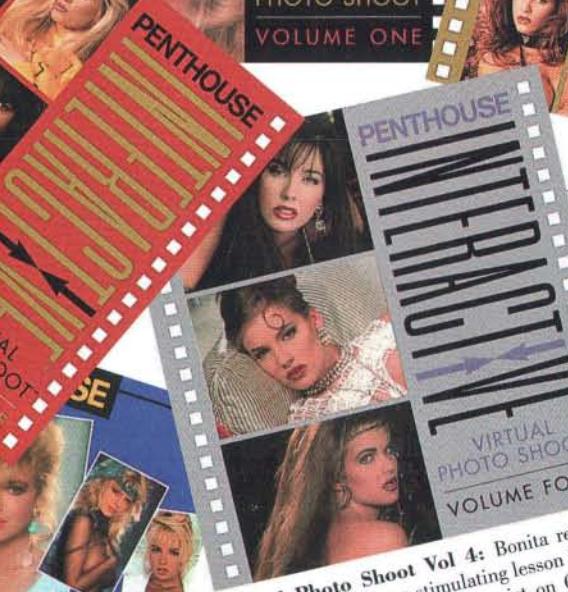


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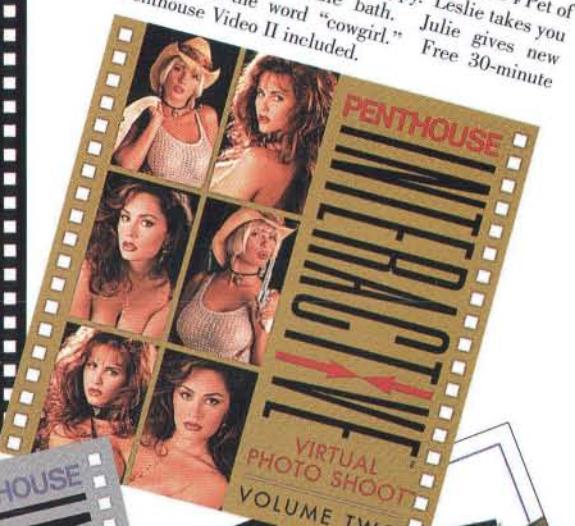
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Interactive TV

◀ 187 users," meaning people from other Bell Atlantic divisions. This first phase of the test was soon to include 1,000 real paying people as well. The overall point is to gauge whether there is enough demand for new video services to justify Bell Atlantic's five-year plan to build an \$11 billion broadband infrastructure.

Like the GTE mainStreet service, this one requires a telephone line. Unlike mainStreet, however, you can still use that line to get phone calls while watching. This service doesn't displace your basic cable service, but adds to it: it requires a second set-top box. Using a technology called ADSL (asymmetrical digital subscriber line), Bell Atlantic channels digital video over the phone lines at speeds of 1.5 megabits per second, allowing for picture quality about the same as regular cable. The upstream signals race back to Reston, where they trigger videos from nCube supercomputers. This technology allows viewers to receive only one program at a time. Starting in 1996, the company plans to supplement the current network with fiber or wireless technology so it

Lifestyles, Kids Zone, and Marketplace, a shopping service that doesn't work yet. Like all the other interactive TV services, each category has a stylized graphical icon. The interface reminds me of the sharp colorful screens of a multimedia reference title. Choose any category, and you get a submenu, again with several different choices.

Kristen enters the family's four-digit PIN so we can order some shows, which would range in price from 49 cents for short cartoons to \$4.49 for recent feature movies – if the Snoots were paying. Currently, there's a total of nearly 700 videos to choose from. Kristen likes the concept of a PIN and may even set up a separate one for Meagan with a limit on what she can watch and how much she can spend on these videos each month. "I like to control the service," she says. She doesn't want her daughter watching too much TV and wants her to watch only what's appropriate for her age.

She hands me the remote. I choose Entertainment. From the submenu, which also offers four categories, I pick an icon labeled TV Favorites – Talk. The screen lists the first six titles in an alphabetical inventory of 34 highly

**Pay-per-view adult programming will do well:
you don't have to worry about running into
someone you know at the video store.**

can supply multichannel cable service. That's when the battle to kick the traditional cable companies out of homes will take place, according to Bell Atlantic.

My main destination on this trip is the town of McLean. A Washington suburb with quiet, tree-lined streets, McLean is one of the older towns of Fairfax. It's a Tuesday afternoon, and I'm accompanied by Bell Atlantic spokesperson Ginger Fisk. We drive up to the colonial home of Kristen Snoots, a 33-year-old single mother who directs a department in Bell Atlantic's consumer services group. When Kristen was growing up in the area, she was allowed to watch only a half-hour of TV per day. Usually, she chose *I Love Lucy*. Now, she's similarly strict with the TV allowance for her dark-haired, 5 1/2-year-old daughter Meagan. "I'm a bit of a control freak," Kristen admits.

After chatting in the living room, we walk downstairs into the den to watch the TV rigged up with the Stargazer service. Meagan skips down the steps after us brandishing a tray of Oreos. I sit down as Kristen turns on the tube. The opening Stargazer screen has four major categories: Entertainment, Learning and

rated reruns of various Geraldos, Donahues, Sally Jessys, and the like. I position the cursor at the bottom of the screen on a forward-arrow icon. When I press the remote's enter button, the next six-video segment of the list appears. Meagan is playing in the other end of the room when Kristen and I spot a listing for a program entitled "Donahue – Addicted to Making Home Sex Videos." "Is this OK?" I ask. Kristen glances over at Meagan, who is not paying attention, then nods her head.

It strikes me that adult programming will do very well on this type of a service. With pay-per-view services such as this, you no longer have to worry about running into someone you know at the video store while checking out a copy of *I Like It Like That*. Most of the fare on the Bell Atlantic service is family-oriented. But the sexiest programs are going gang-busters, says Fisk, the PR person. The most popular movie this month, she adds, has been *Belle Epoque*, which is listed under the Movies – Drama submenu. For many current releases, you can watch a short preview before buying. Just select the title from the menu and position the cursor on the "preview" icon on

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Color separations are made on a DS America 608 scanner linked directly to a 10-track Scitex system. Preliminary color corrections are performed on a Scitex Imager and proofed on the paper stock using a Kodak Approval digital color-proofing system. Additional electronic prepress is performed in-house at *Wired*, using scans from the DS America 608, UMax UC 1260, Nikon Coolscan, and Kodak PhotoCD. Composed QuarkXPress-pages are then converted to PostScript, which is then translated into Scitex language using VIP 2.6 and sent through Gateway Tools 2.0 to the Scitex system's Micro Assembler. Composed digital proofs are submitted for final approval. Final film is plotted on a Scitex Dolev.

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Drugs of choice: Altoids, chicken(kung pao, thai curry, teriyaki, etc.), Chupa Chups Melody Pops, melatonin, merlot, Rutherford Ranch Sauvignon Blanc, wasabi-roasted green peas, Yohimbe.

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Interactive TV

◀ 190 the screen. I do that to find out that this French feature is about a soldier who returns from battle only to face the "dilemma" of four voluptuous young women wanting his body.

To cool things down, I hand the remote over to Meagan. Standing in front of the TV, she chooses Kids Zone, which is broken down into Movies, Fun Fair, Let's Explore, and Story Place. While munching on her Oreos, she chooses Movies and scrolls down a menu of offerings until she sees "Rainbow Bright and the Star Stealers," a rather interesting cartoon story about a heroic horse with a multicolored mane. She's already watched the movie four times in the past 10 days. That would cost \$1.49 a shot, if the Snoots were paying.

I ask Meagan for her candid assessment of the service. She scrunches up her face in deep thought and then shouts: "Best TV ever!" But Kristen is not sure she'll keep the service when Bell Atlantic starts charging for it – it depends on the price. She says she's not a big TV watcher, averaging only about an hour per day. They don't even have cable, to begin with, and they rent only about three videos per month. But, recently, she says she's "sworn off" the video store, after returning a copy of *Auntie Mame* so late it cost her \$44 in late fees. On average, she says she was spending \$16 to \$18 on late fees per movie. Video-on-demand appeals to her mainly for that reason. Indeed, the video rental industry is known to get about 30 percent of its revenue from late fees. But still, Kristen is worried that Meagan likes Stargazer a bit too much. "Why do I want something that will increase her TV usage?" Kristen says. "That's not an objective of mine."

Later in the afternoon, I'm back at the digital factory in Reston, talking with Bell Atlantic business director Kent Libbey about how this service will turn a profit. He expects that most or all of the \$15 per month that consumers in the target market currently spend on video rentals and premium channels will shift to the Stargazer service. But he, too, says the business model won't work without interactive advertising. He is negotiating with consumer goods companies and ad agencies to determine whether they will pay extra to "direct their message" to particular viewers "and get a response back." He also expects that the price consumers pay for programming will be a function of how many ads they are willing to accept as interruptions or enhancements to the shows they watch. One possibility is to offer credits for customers to participate in direct marketing. For example, viewers would use their remotes to answer personal ques-

tions about life insurance, beer, or cosmetics in return for a free movie.

What if this new advertising model doesn't work? What if people just want to watch their videos and be left alone? If that's the case, Libbey says, "We might have to adjust the size and scope of the offering." In other words, Bell Atlantic might have to scale back its plans.

At the end of my tour, I'm weary, bleary, and burdened with stacks of press kits. All the technology and test markets are blurring together in my mind. It's no longer a mystery to me why everyone in this business has essentially the same vague business model. The net affect of all the alliances that have been written up in *The Wall Street Journal* for the past three years is this: everyone is in cahoots with everyone else. Bell Atlantic is collaborating with Microsoft. Microsoft is in bed with TCI. TCI works with U S West. U S West has an investment in Time Warner. Time Warner is aligned with AT&T. AT&T has done deals with GTE. And so on. They visit each other's trial zones, attend the same conferences, buy the same market research.

Mainly, I was struck by the common threads running through all the tests. All these corporations have the same top-down view of how they can force a change in people's entrenched viewing habits. They all project how revenue will shift from other industries, such as retailing, into their own. They all can demonstrate how their central computers can keep track of every click viewers make. And they all pine for the day when people sell out their communities for the sake of a more convenient way to shop. Meanwhile, none of these companies are doing much about making their systems compatible with each other's. "It's as if we had to create different commercials for each channel," says Judy Black, who chaired a technology committee for the American Association of Advertising Agencies. "That's just not going to fly." And they're not doing much about making them truly two-way. Or about opening up their networks – à la the Internet – so consumers can be producers, creating their own programming and distributing their own videos.

By the time I return to my own living room, I am sure that I don't want anything to do with this. I do not want to shop for socks. I don't want a smart set-top box. I do not want a 9-pound ham. I'll just stay the spud I am. I just want to plop down on the sofa, turn on the entertainment, tune out my higher brain functions, and exercise my constitutional right to stare vacantly at the tube, resting assured that interactive television is still little more than an oxymoron. ■ ■ ■

Message 25:
 Date: 7.1.95
 From: <nicholas@media.mit.edu>
 To: <lr@wired.com>
 Subject:

Andy makes my computer faster. Bill uses more of it. Andy makes my computer yet faster and Bill uses yet more of it. Andy makes more; Bill uses more. What do you and I get when Intel and Microsoft keep adding and taking? Almost nothing. My computer takes forever to start up. Loading my word processor is interminable. Each new release of an application is festooned with gratuitous options and an army of tiny icons the meanings of which I no longer remember.

We've all heard that an application program exposes only the tip of its iceberg. Well, I normally use only the tip! My old Mac 512K went "boing" and was on. I still run Microsoft Word 4.0 (and would run Word 2.0 if I could) because it's fast and simple. The last six years of advances in personal computing have resulted in diminishing returns when

Congress worries about the information-rich versus the information-poor, but most of its members probably don't realize that computers can cost less than bicycles.

one considers the performance we see.

According to Moore's law (Gordon Moore is Andy Grove's partner and mentor and the co-founder of Intel), since I installed Word 4.0 six years ago, my system should now be running 16 times faster – not slower. My lament is, Why can't my system run at the same apparent speed it did six years ago and cost 16 times less?

What's going on? Simple. First, the cost of personal computers is held artificially at US\$1,500 (give or take \$500), because the current market can bear this amount, and it provides a suitable profit margins for manufacturers. Second, software is growing far too complex (featuritis), so clean, simple systems are almost extinct. Third, it has been historically difficult for American technology companies to be in the commodity business and sell 10 million computers at \$150 instead of 1 million at \$1,500.

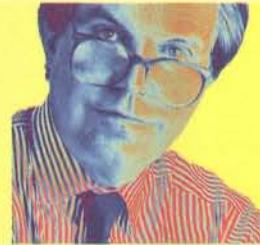
Software and hardware companies can get away with the \$1,500 price tag when their primary customers are other businesses. But now that the home is the fastest-growing market, they've got to think about you as the customer – and this is an entirely different game. Don't let anyone tell you

Affordable Computing

that a \$1,500 price tag is endemic because computers are just plain expensive. Do you need proof that they can be cheap(er)?

Nintendo has released a 20-MHz, 32-bit RISC machine called the Virtual Boy (what an awful name) that includes extraordinary 3-D graphics and stereo sound; two built-in displays with four levels of gray; and a novel, two-hand game controller. Its retail price is \$199, and it comes with one game cartridge. This product arrives at a time when the yen is below 85 to the dollar. Nintendo is not losing money on the razor to sell the blades.

Why not take that kind of power and build it into a more general-purpose – but stripped-down – machine, with Netscape or Mosaic built in, that everyone can afford? Congress worries about the information-rich versus the information-poor, but most



of its members probably don't realize that computers can cost less than bicycles.

Running Moore's law in reverse

In 1976, I had a CRT terminal, the Fox, made by Perkin Elmer (formerly in the business). The Fox had a small footprint, compact display, and minimal but adequate keyboard. It cost \$200. According to Moore's law, the achievable complexity of an integrated circuit doubles every 18 months. If I correlate complexity with dollars, \$200 of 1976 Fox should be worth about \$1 million of computer today. So, for one five-thousandth of that amount, why can't I get what I had in the Fox, plus color and local computing?

The answer is, I can. Manufacturers just need to be pushed into this commodity business so that every school and low-income household can own a computer. This can be achieved without subsidies by trimming the fat from today's PCs and making some bare-bones engines that word process, telecommunicate, and provide access to online services. Use a modest color display: a 13-inch window into the Net is better than no window at all. People are always amazed by the amount of daylight let

into a dark room by a small hole (witness the Pantheon in Rome). It's the same on the Net.

Advertiser-supported computing

But even \$200 may not be low enough. Or, manufacturers may say, Fine, but give me an order for 10 million, then I'll build it for you. OK. Here's an idea for how such a notion can be achieved, getting both the order for 10 million and reducing the price to zero (or lower). Listen carefully, AOL.

Today, there are more than 100 million computer screens in the United States. Think of every screen as a potential billboard. Let's assume that each one is turned on once a day and, lo and behold, each day a new advertising message appears – the screen saver for the day. That message could be targeted to specific users. No sense showing me an ad for Bourbon if I don't drink hard liquor or a commercial for Geritol if I'm 6 years old.

Manufacturer X (the one taking the order for 10 million machines from AOL) would probably have to build a small RF receiver so it could load these machines with personalized commercials but without requiring the user to log in or pay for connection time. This could be done, for example, through terrestrial broadcasts using the likes of Mobile Telecommunications's SkyTel.

There are several ways to implement this and more ways to make the business model attractive to vendors (and the computer more or less free). Advertisers would pay to gain access to what turns out to be about 2,000 acres of advertising space (changeable per square inch, per day, or per hour). That money could subsidize the cost of the computer and even pay for you to use it.

Will this really work? Yes. Of course, many details need to be resolved. My point is not this specific example, but the need for some creative thinking about how to make and price PCs. I am no great fan of advertising, but it does represent a quarter-of-a-trillion-dollar industry, and there must be a way to use its size to make computing affordable to all Americans.

So, step one is to get Andy and Bill to stop scratching each other's backs, and step two is to find new business models to make low-cost PCs available to consumers through the intelligent use of advertising. Come on, boys. ■ ■ ■

Next Issue: PC Outboxes TV

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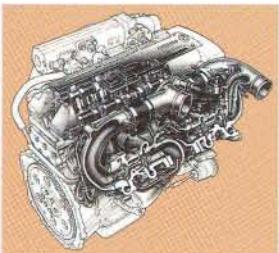
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